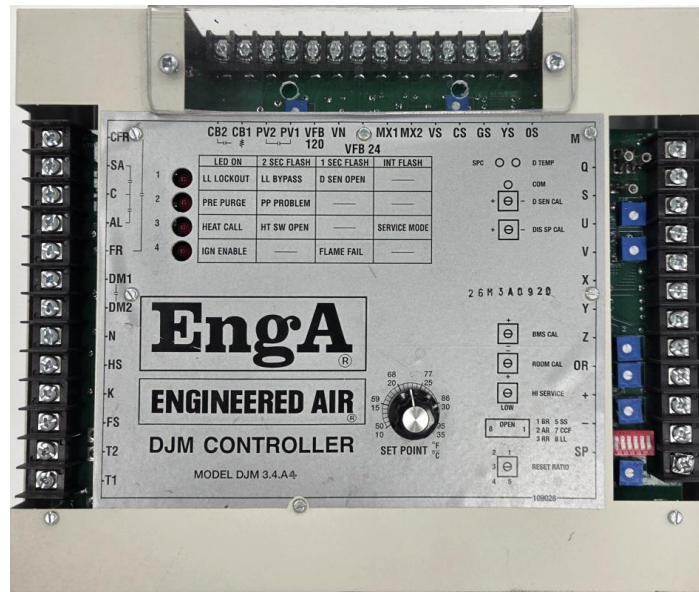




# DJM3 control board.

## Operation guide.



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## DJM3 controller.

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## DJM3 controller.

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## DJM3 controller.

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## DJM3 controller.

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## DJM3 controller.

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# Introduction.

- Part of the TRAC family of controllers.
- Used with DJ(E,S,X) units up to 1.4MBH.
- Independent heating and ventilation controller.



# Introduction.

- Operating temperature:  
-40 to 105°F (-40 to 40.6°C)
- Discharge setpoint:  
50 to 95°F (10 to 35°C)
- Power supply: 24 Vac, 40va
- Fuse Rating: 1.5 GDC slow-blow



# Function.

## Three main functions.

1. Supply blower and inlet damper control.
  2. Burner management.
  3. Temperature control.
- Stand alone.
  - Optional discharge temperature reset functions.
  - P.I. control.





# What is P.I. control?

## P.I. control.

- A Proportional-Integral (P.I.) controller in a heating system continuously adjusts the heating output based on both the current temperature error (how far you are from the setpoint) and the accumulated error over time. This prevents the system from oscillating while eliminating the "droop" (steady-state offset) common in basic proportional systems.



# What is P.I. control?

## P.I. control.

- P - Proportional: Acts as the "immediate reaction." The farther the current temperature is from the setpoint, the harder the unit works. As the temperature nears the setpoint, it scales back the signal to prevent overshooting.



# What is P.I. control?

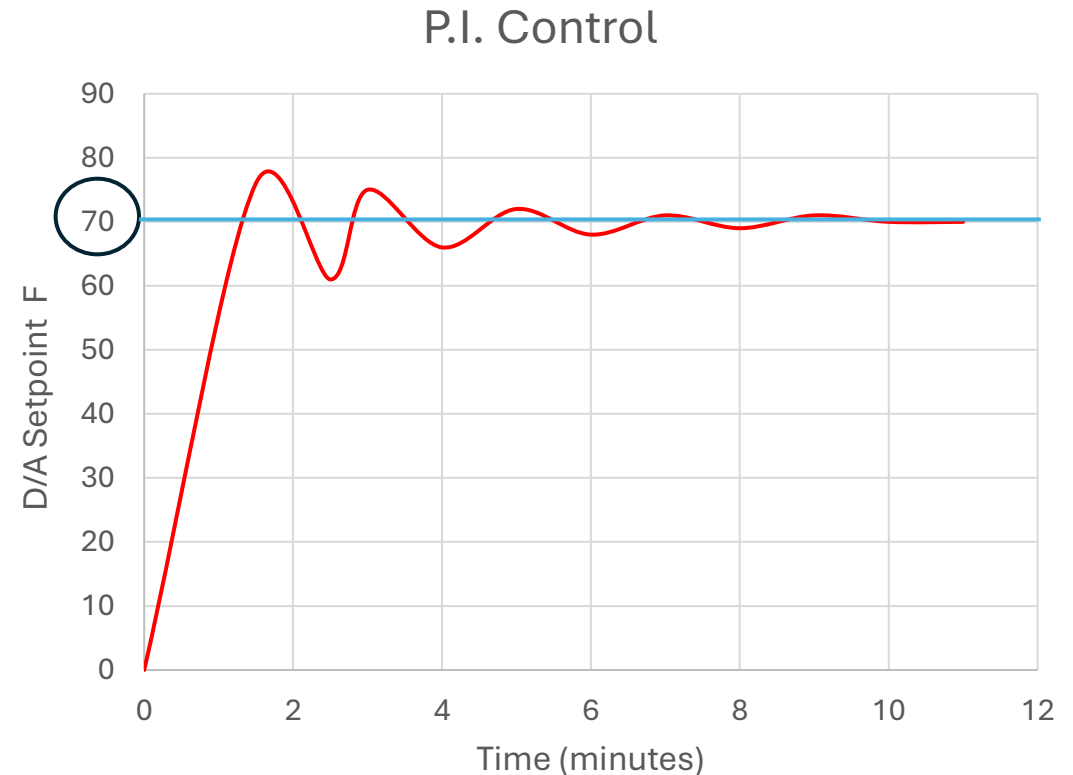
## P.I. control.

- I - Integral: Acts as the "long-term memory." If the P-controller leaves the system stuck slightly below the setpoint temperature, the I-controller slowly accumulates that minor, lingering error over time. It continuously boosts the output until the temperature perfectly aligns with the setpoint.



# What is P.I. control?

- On initial startup, the DJM3 brings the discharge temperature quickly to within 10°F of the calculated set point.
- Small output corrections to the gas valve are gradually made until the discharge air temperature is within 1.5°F from the setpoint.
- During cycling between low fire / off, there will be some temperature swings (less for high efficiency burner).



# 15:1 turndown ratio.

## Turndown ratio.

- The DJM3 control board has a turndown ratio of 15:1.
- What does that mean?



# 15:1 turndown ratio.

## Turndown ratio.

- A 15:1 turndown ratio means a heating appliance can reduce its maximum heat output to 1/15 (or roughly 6.7%) of its full capacity while still operating efficiently. For example, a 1,000,000 BTU/h DJ can modulate its output down to 66,666 BTU/h when less heat is required.



# 15:1 turndown ratio benefits.

## Benefits.

- **Prevents Short-Cycling:** Instead of constantly turning completely on and off (short-cycling) during mild weather, the appliance runs continuously at a lower firing rate.
- **Energy Efficiency:** Long, continuous burner operation reduces the energy lost during the appliance's pre-purge and post-purge ventilation cycles.
- **Less Wear and Tear:** Fewer mechanical start-ups put less stress on components, which can extend the lifespan of the equipment.
- **Consistent Temperature:** Because the heater is always lightly running, you experience more gradual, steady indoor temperature control rather than hot/cold swings.



# How is the 15:1 turndown ratio achieved?

## Turndown ratio.

- The DJM3 modulates a variable speed combustion blower in conjunction with an electromagnetic modulating gas valve. The combustion blower speed and the gas valve's flow rate will be modulated to satisfy the discharge temperature requirements.



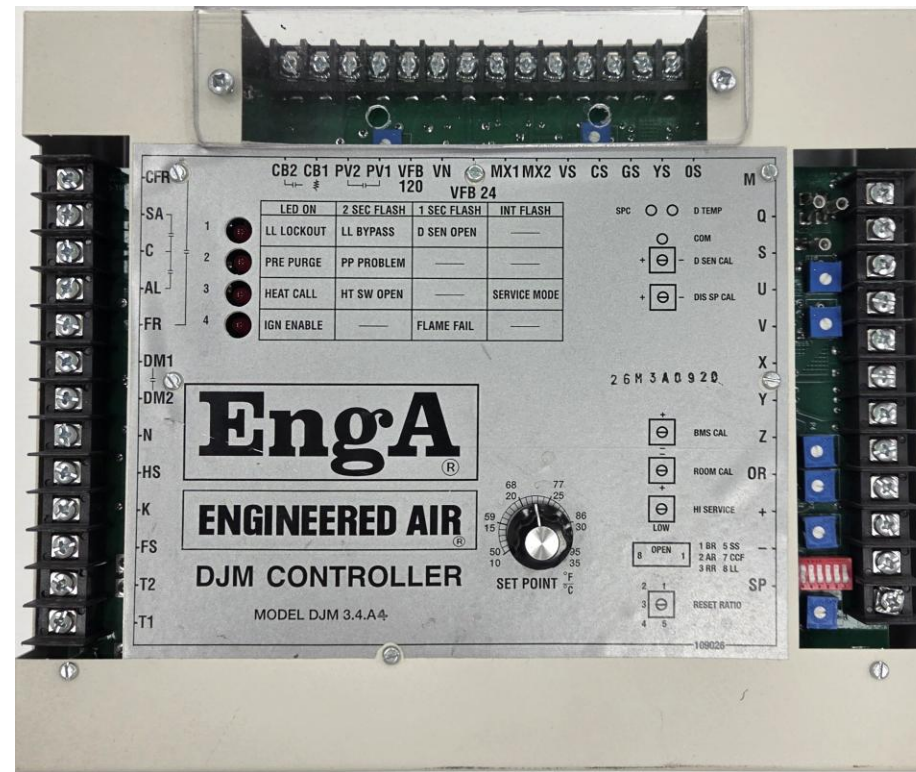
# How is the 15:1 turndown ratio achieved?

## Turndown ratio.

- The gas valves opening curves are programmed into the DJM3's logic. All the air and gas control is done electronically to simplify burner set up and eliminate the need to adjust troublesome mechanical air/fuel linkages.

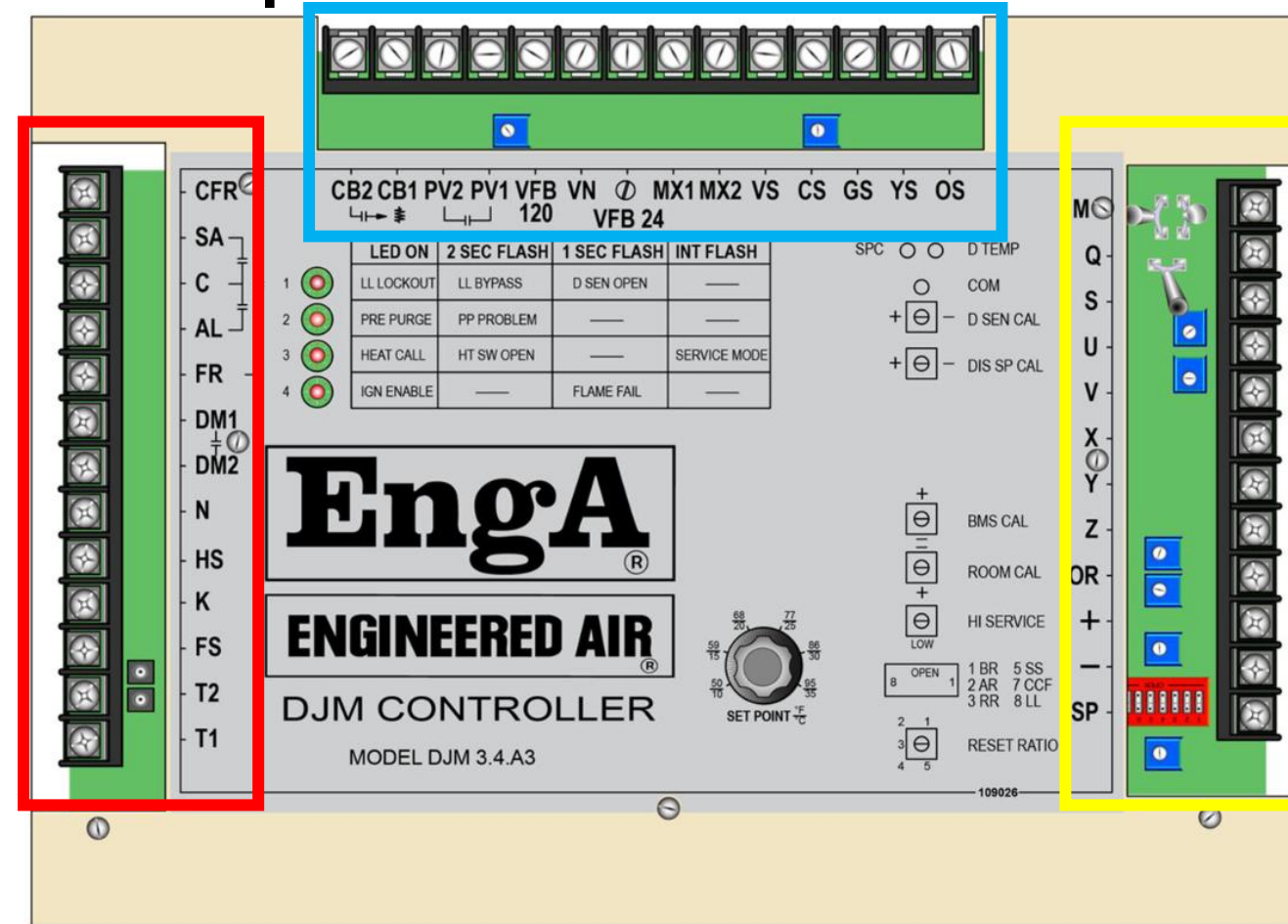


# Navigating the DJM3 control board.



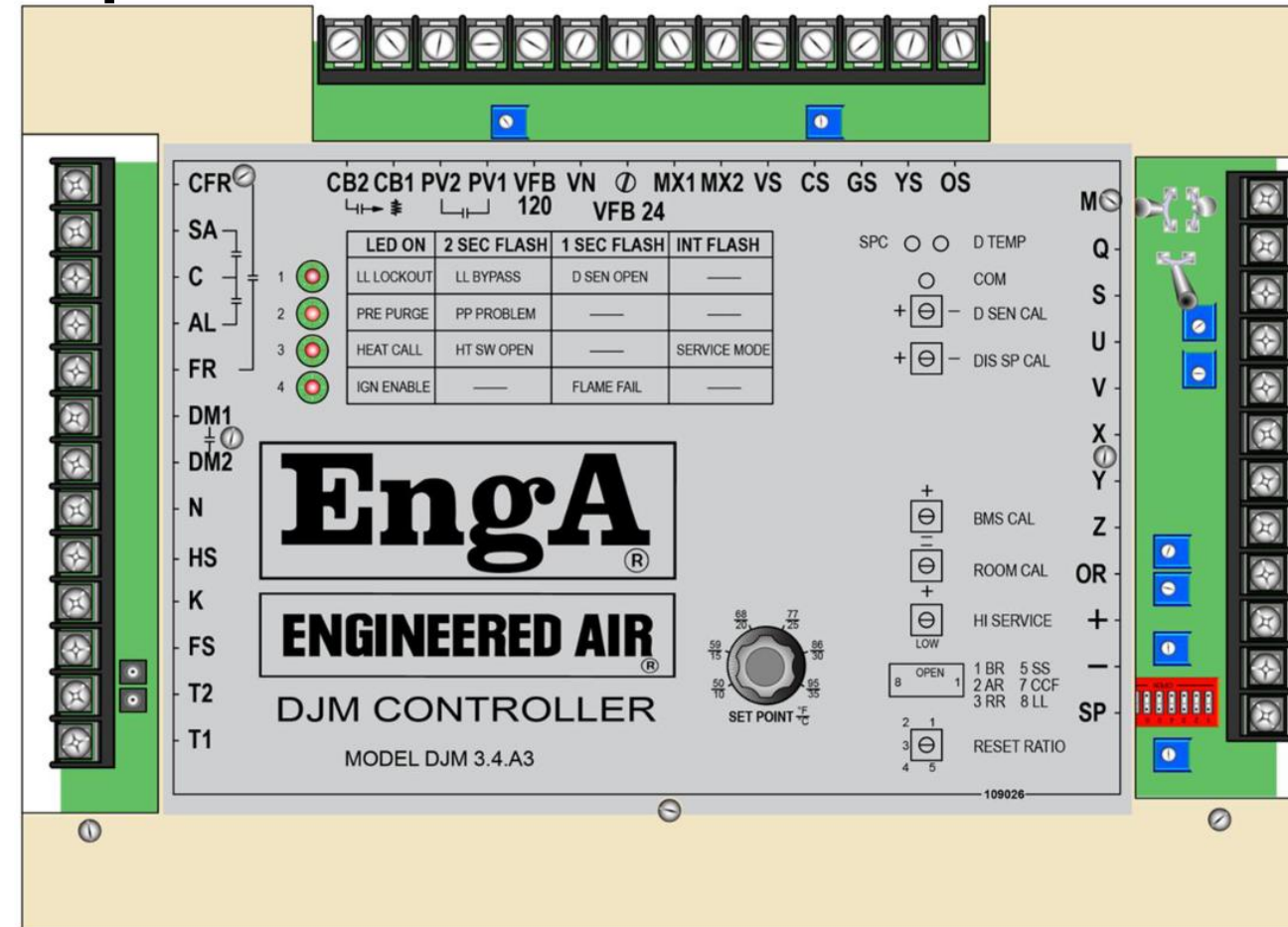
# Terminal descriptions.

| Terminal   | Description                                                 |
|------------|-------------------------------------------------------------|
| T1         | Board power supply. (HOT) 24 Vac isolated.                  |
| T2         | Board power supply. (NEUTRAL) 24 Vac isolated.              |
| FS         | Fan switch (or Day mode) enable input (24 Vac).             |
| K          | Night (unoccupied) mode enable input (24 Vac).              |
| HS         | Heat enable input (24 Vac).                                 |
| N          | Grounded 24 Vac neutral (reference to FS, K, HS).           |
| DM1, DM2   | Damper motor output contacts (dry).                         |
| FR, CFR    | Flame relay output contacts (dry).                          |
| AL         | Alarm output.                                               |
| C          | Contact common input power (to AL and SA).                  |
| SA         | Supply air fan enable output.                               |
| CB1        | Combustion blower motor input.                              |
| CB2        | Combustion blower motor speed control output.               |
| PV1, PV2   | Pilot valve disable contact (dry).                          |
| VFB120     | Main gas valve feedback (SSOV) hot input for 120V valves.   |
| VFB24      | Main gas valve feedback (SSOV) hot input for 24V valves.    |
| VN         | Main gas valve feedback (SSOV) neutral input.               |
| MX1, MX2   | Modulating valve output. (DC volts)                         |
| VS         | Legacy input. Not used.                                     |
| OS, GS, YS | Combustion blower speed sensor input.                       |
| Q, U       | Discharge air temperature sensor input.                     |
| S SP M     | Internal (jumped) or external discharge setpoint inputs.    |
| V X Y Z    | Modulating (resistive) room / return air thermostat inputs. |
| OR         | Single stage heat thermostat input.                         |
| + / -      | 0-10 Vdc (4-20 mA) temperature reset input.                 |



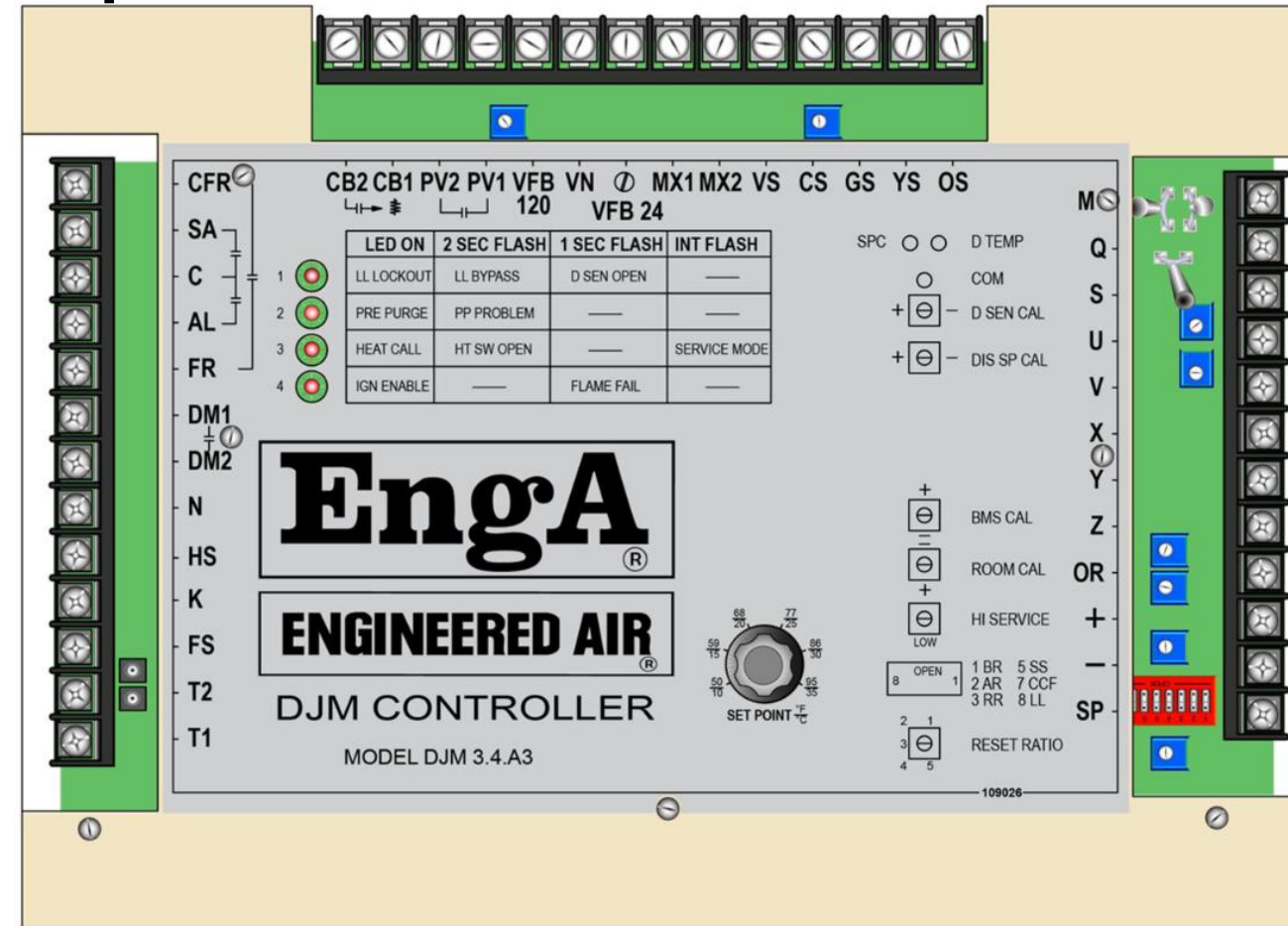
# Terminal operation.

Terminals T1 and T2.  
Board power supply.  
T2, (NEUTRAL) 24vac isolated.  
T1, (HOT) 24vac isolated.



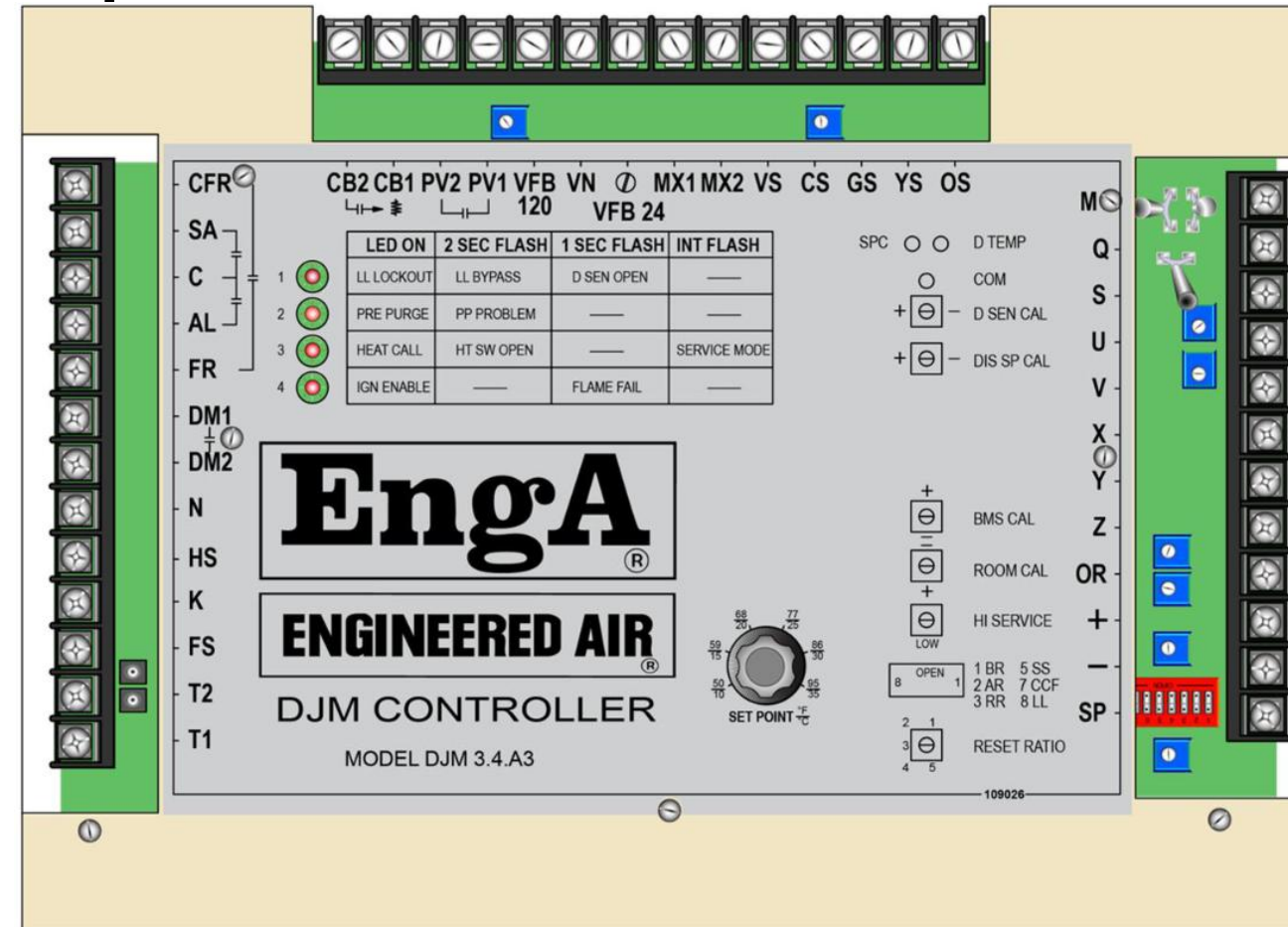
# Terminal operation.

Terminal FS, enable input.  
Fan switch (or day mode).  
24vac.



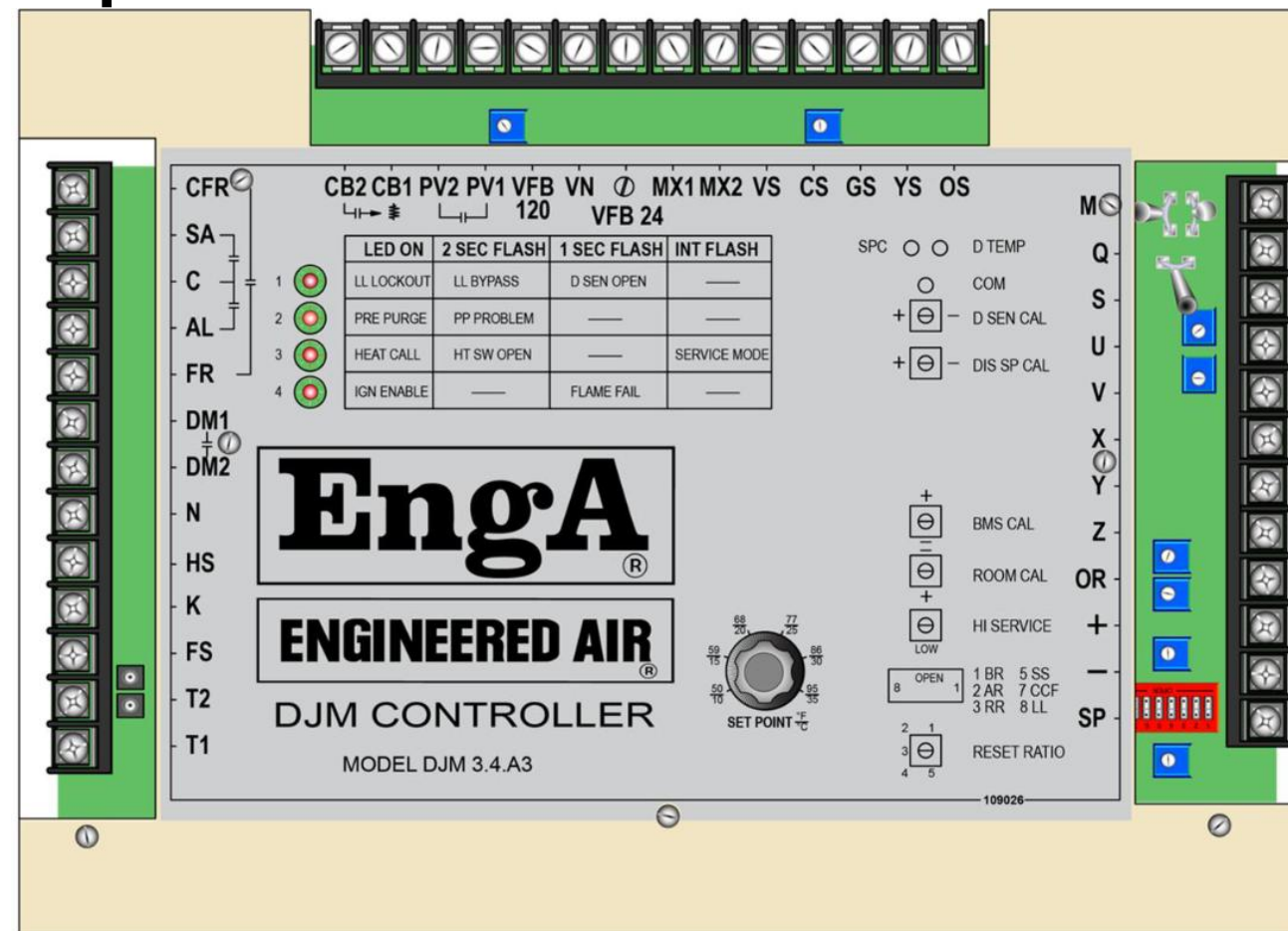
# Terminal operation.

Terminal K, enable input.  
Night (unoccupied) mode.  
24vac



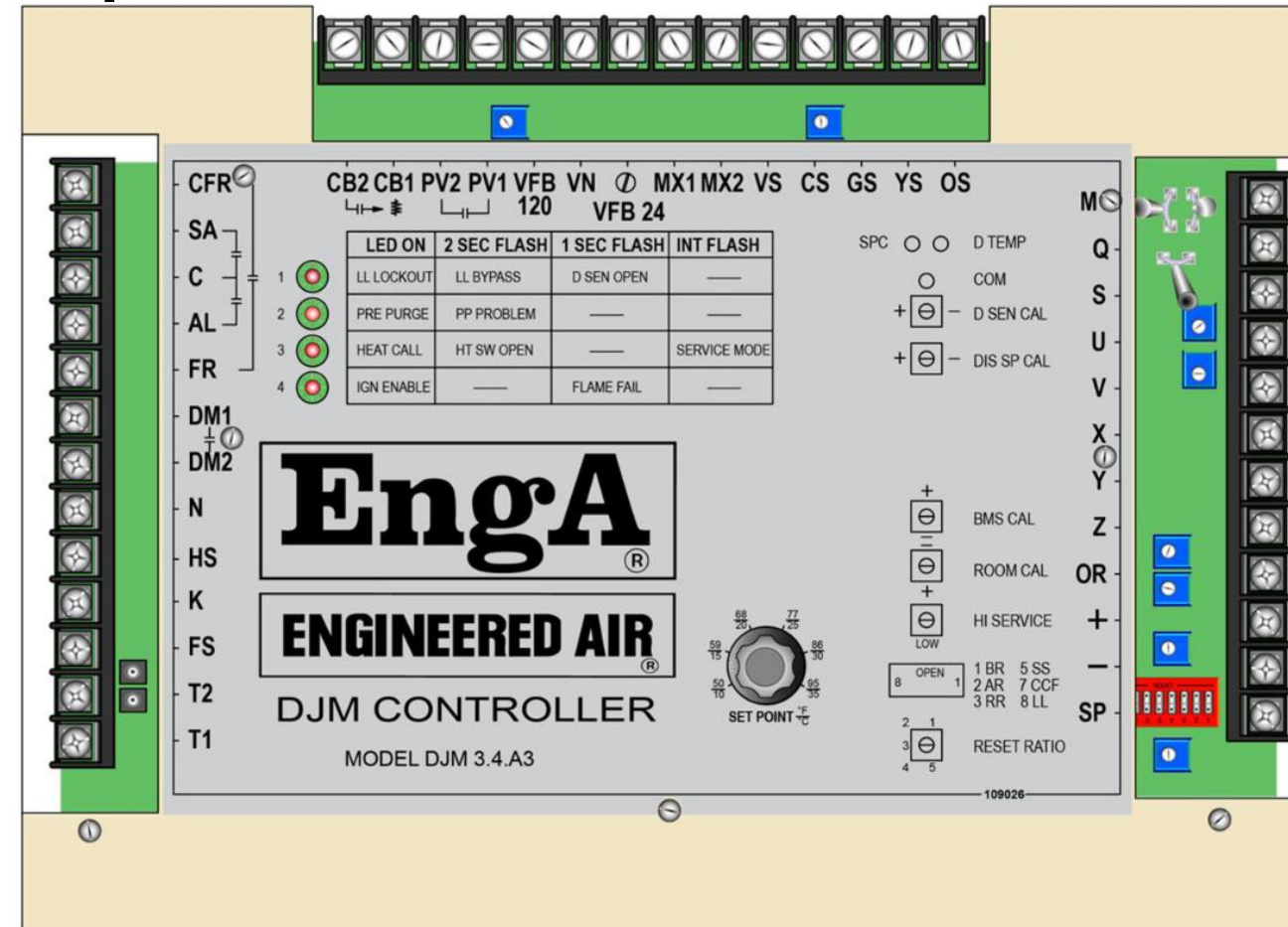
# Terminal operation.

Terminal HS, enable input.  
Heat switch.  
24vac.



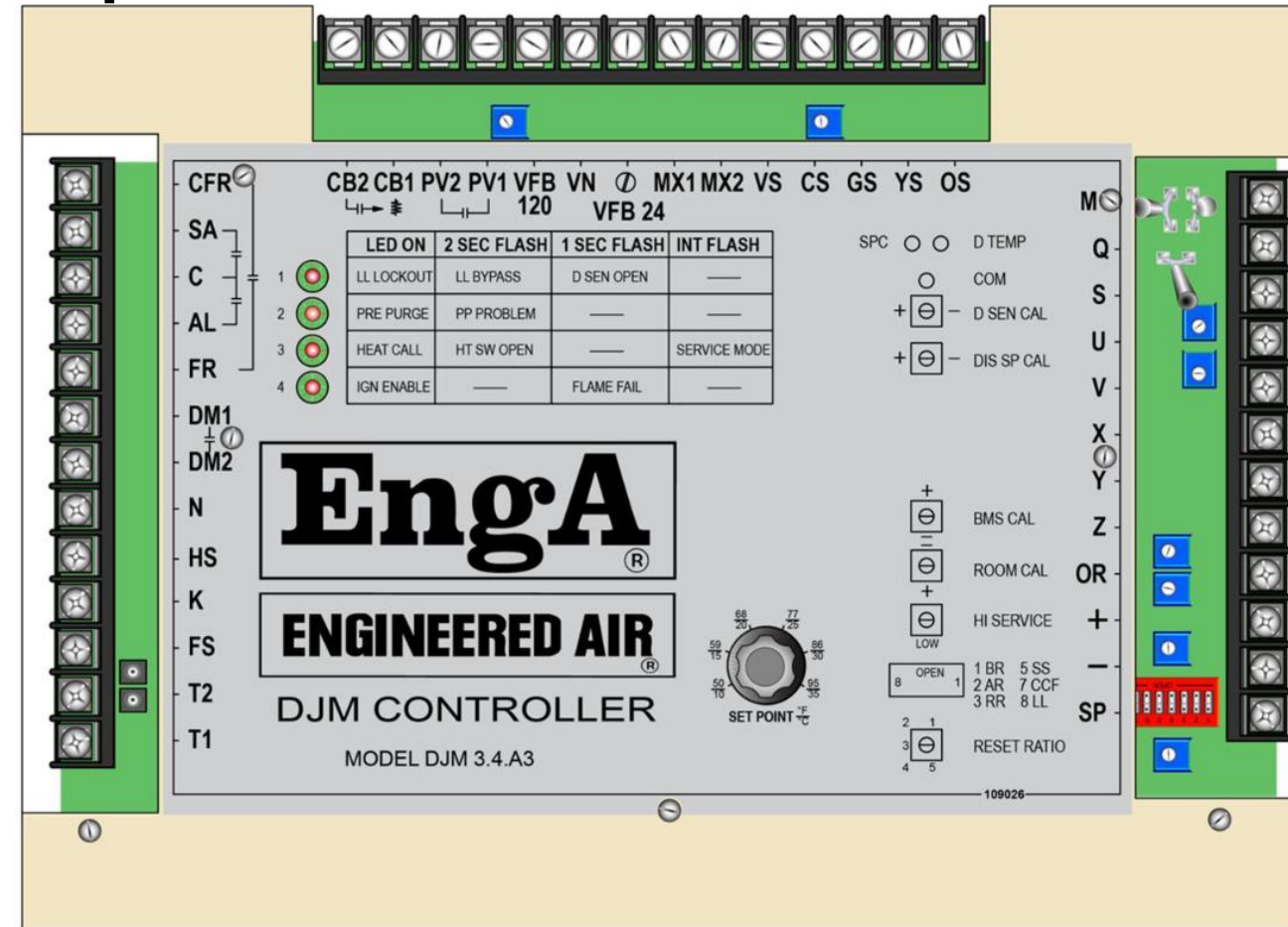
# Terminal operation.

Terminal N.  
Grounded 24vac neutral.  
Reference to (FS,K,HS)



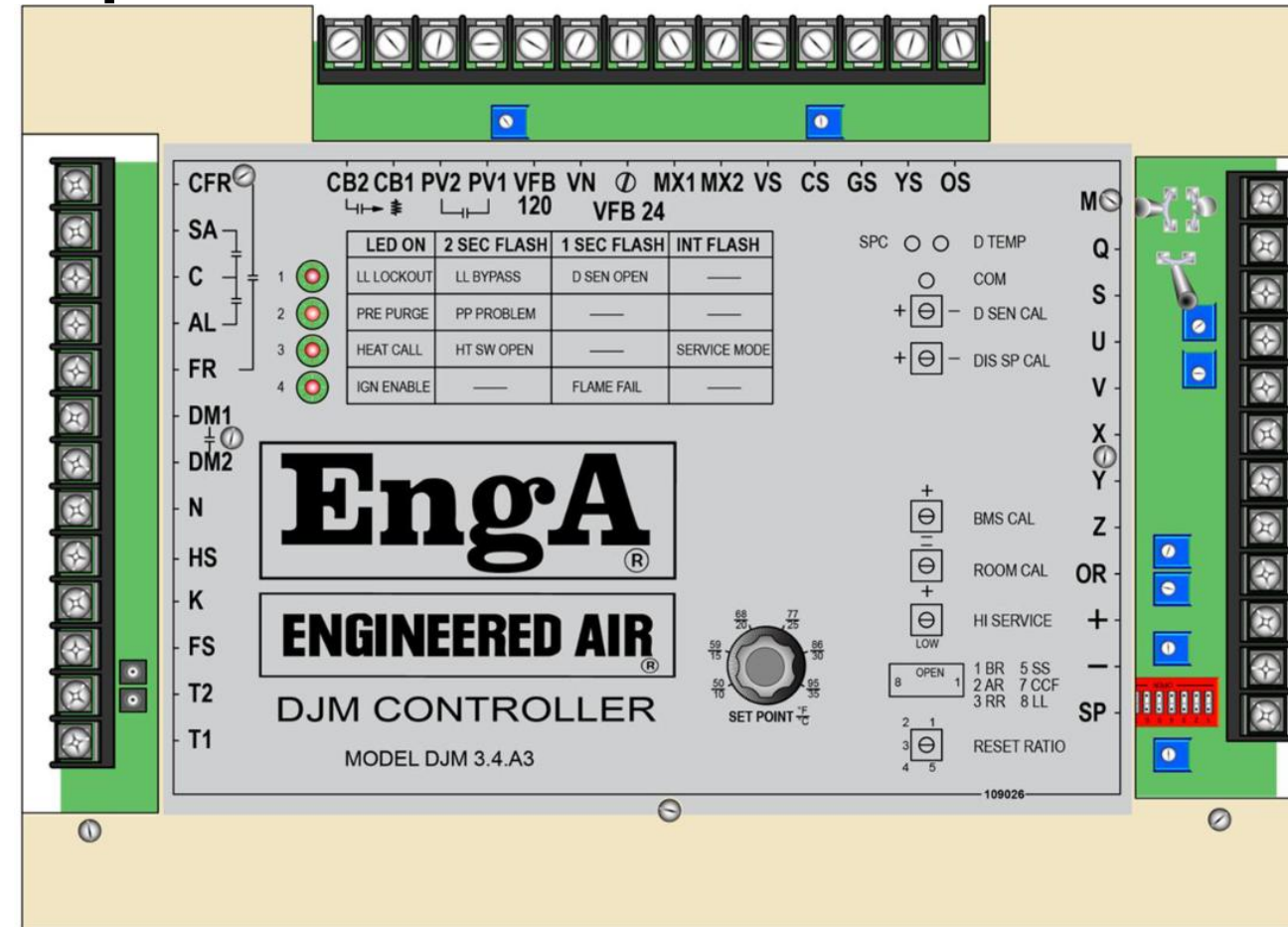
# Terminal operation.

Terminals DM1 & DM2.  
 Damper motor output contact.  
 (Dry)  
 DM1, voltage input to DJM3.  
 DM2, voltage output from DJM3 to  
 damper motor.



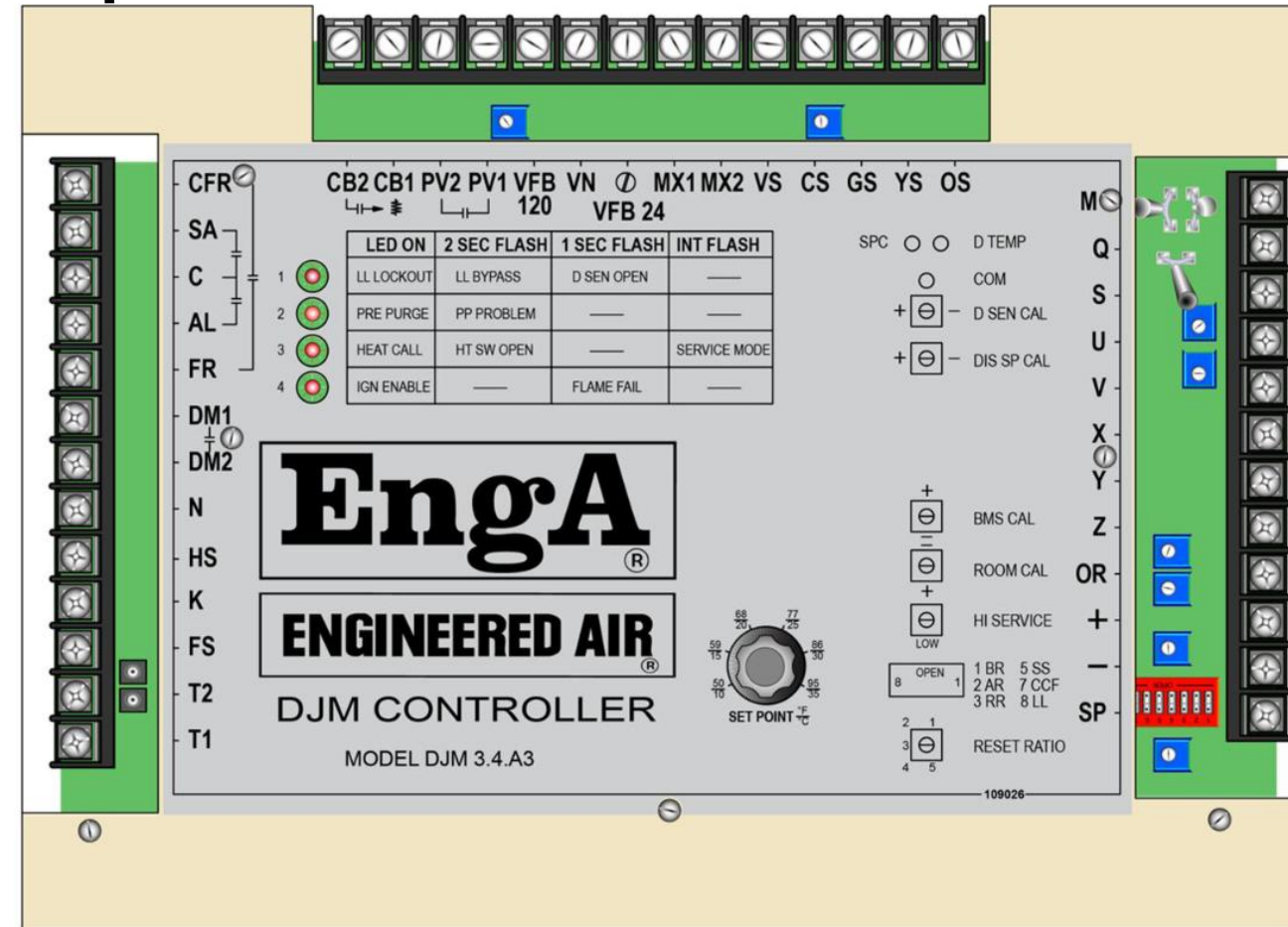
# Terminal operation.

Terminals AL.  
Alarm output.



# Terminal operation.

Terminals CFR & FR.  
 Flame relay output contact.  
 (Dry)  
 CFR, voltage input to DJM3.  
 FR, voltage output to ignition  
 controller.



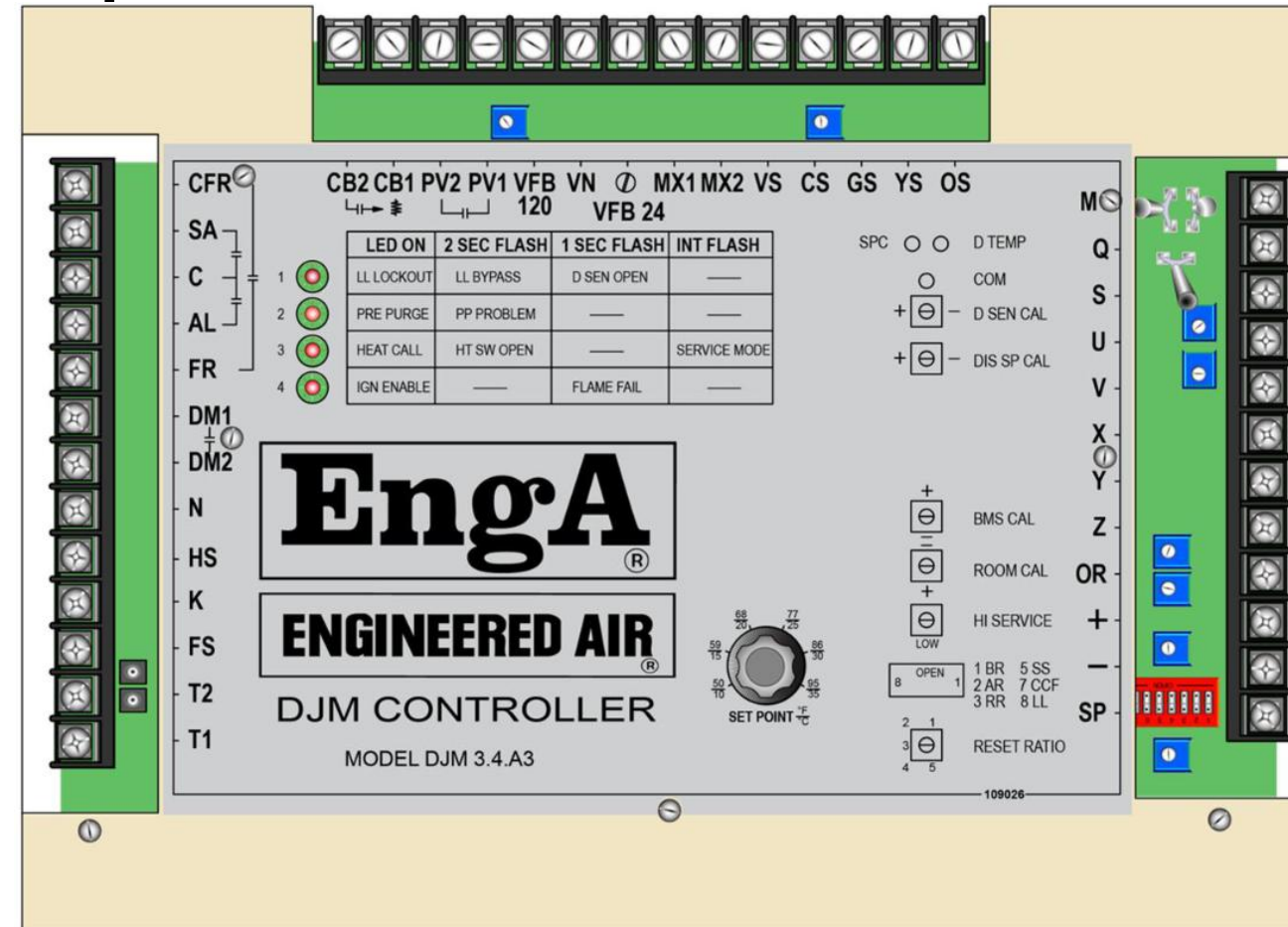
# Terminal operation.

Terminals C, SA & AL.

C, Contact common input power  
(to AL and SA).

C, voltage input to DJM3.

SA, Supply air fan enable output.  
controller.



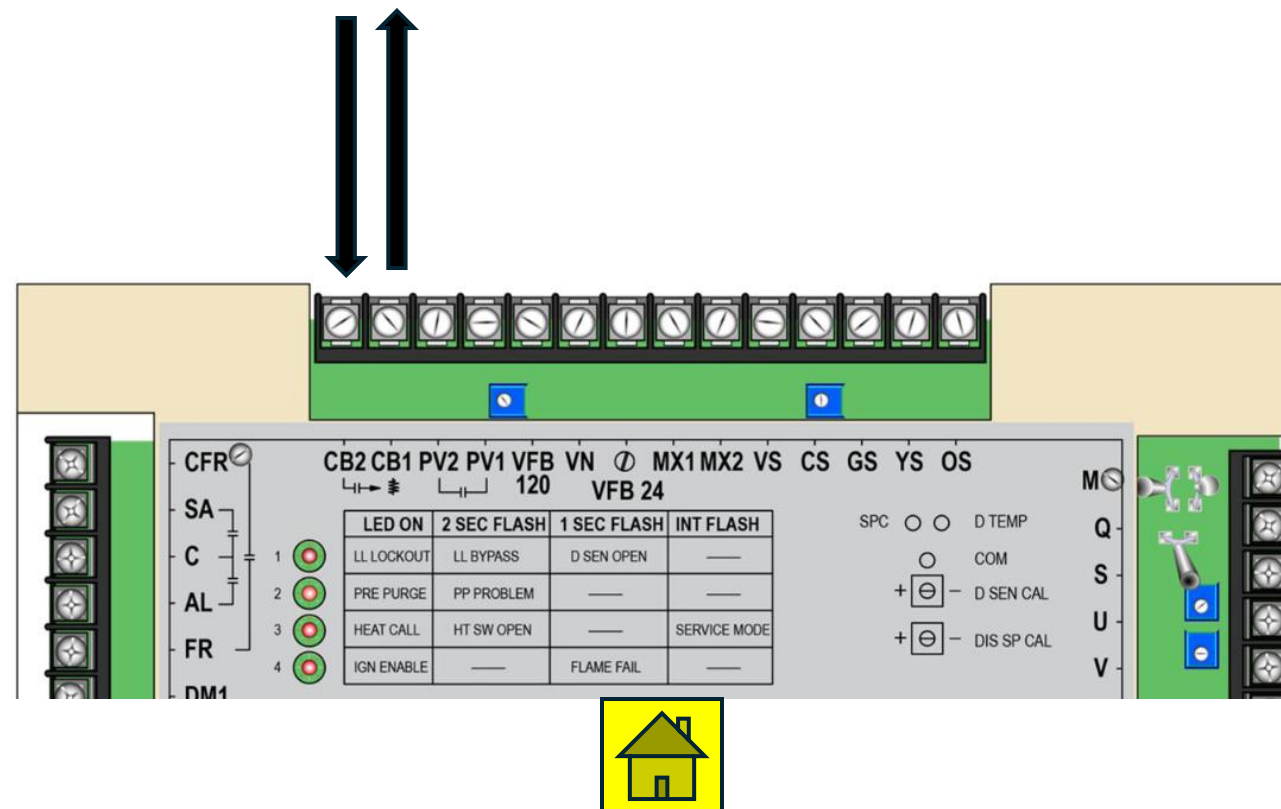
# Terminal operation.

Terminals CB1 & CB2.

CB2, Combustion blower motor input.

CB1, Combustion blower motor output.

120vac.



# Terminal operation.

Terminals PV1 & PV2.

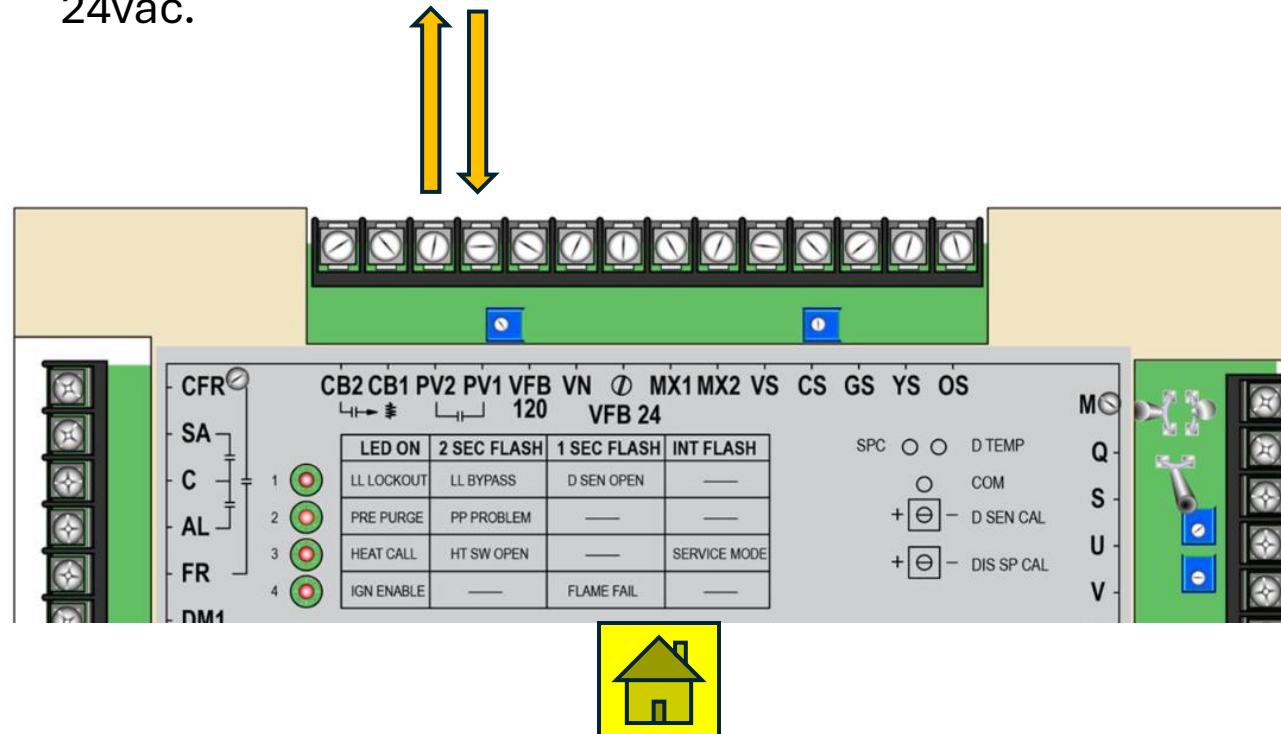
PV1, PV2. Pilot valve contact.

PV1, voltage from ignition controller.

PV2, voltage to pilot valve.

Closes to light pilot, opens once main flame is on.

24vac.



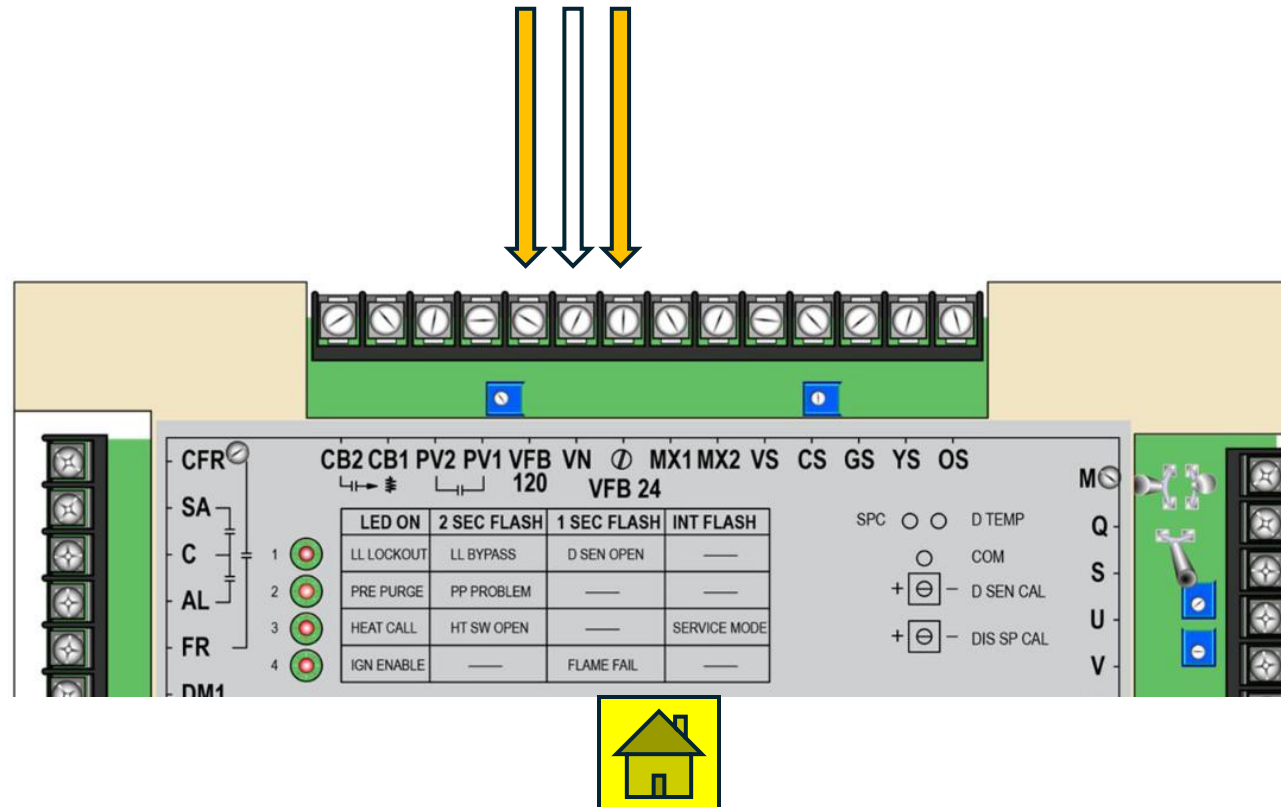
# Terminal operation.

Terminals VFB120, VN, VFB24.

VFB120, Main gas valve feedback(SSOV) hot input for 120vac valves.

VFB24, Main gas valve feedback(SSOV) hot input for 24vac valves.

VN, Main gas valve feedback(SSOV) neutral input.

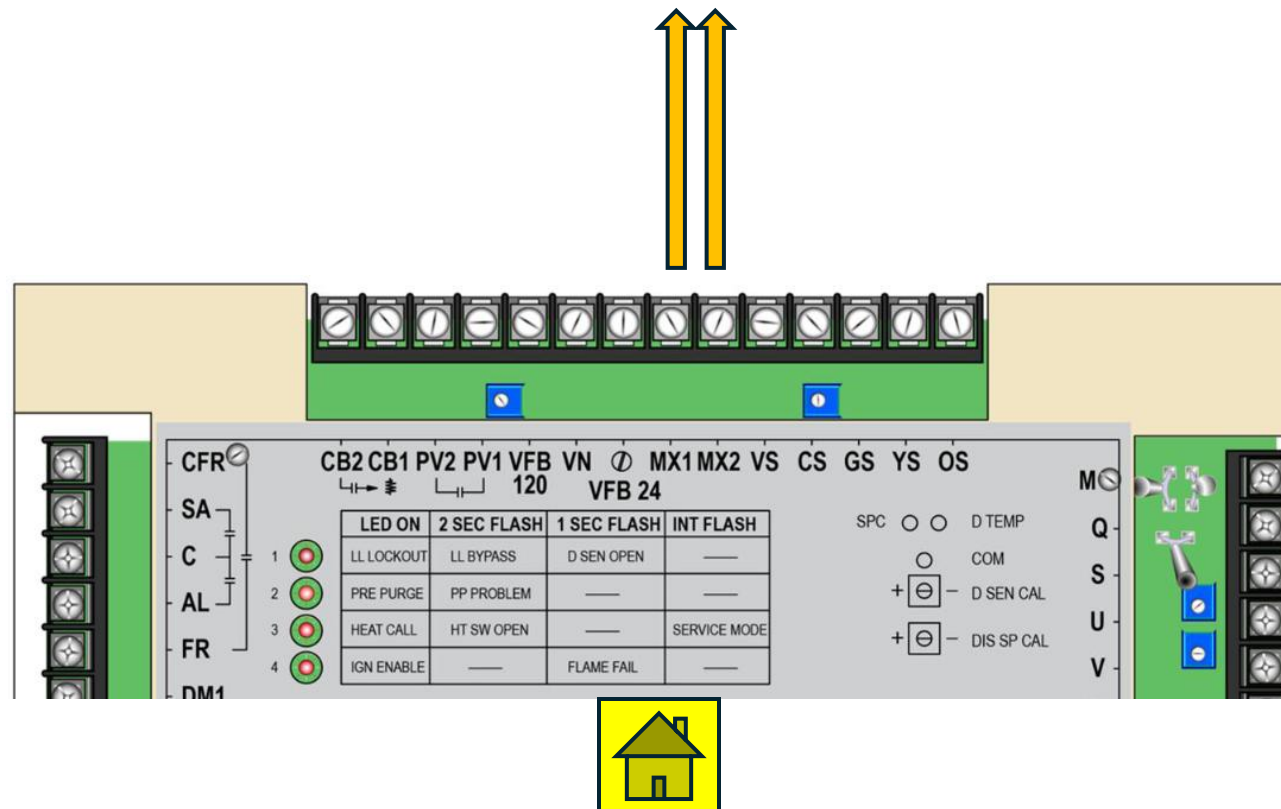


# Terminal operation.

Terminals MX1 & MX2.

MX1 and MX2, Modulating valve output (DC volts).

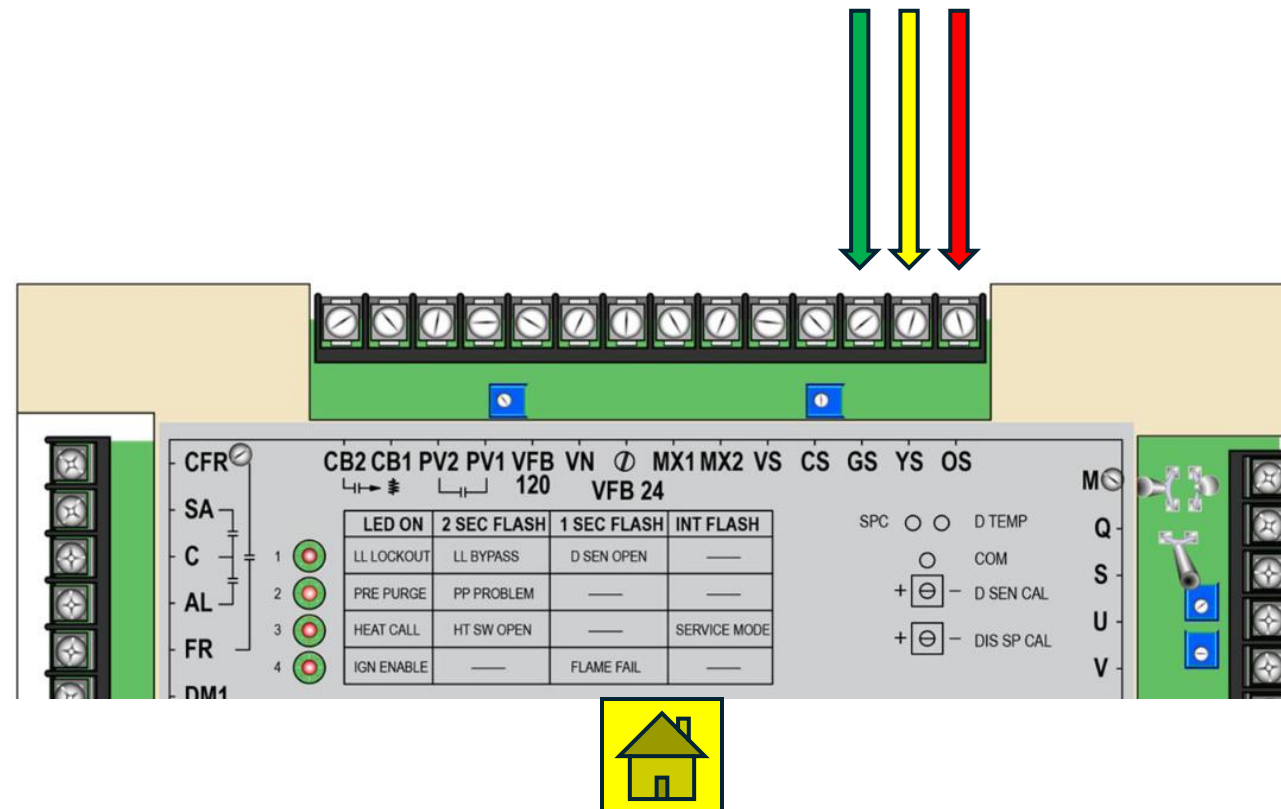
Voltage can range from 0-20vdc, depending on modulating valve.



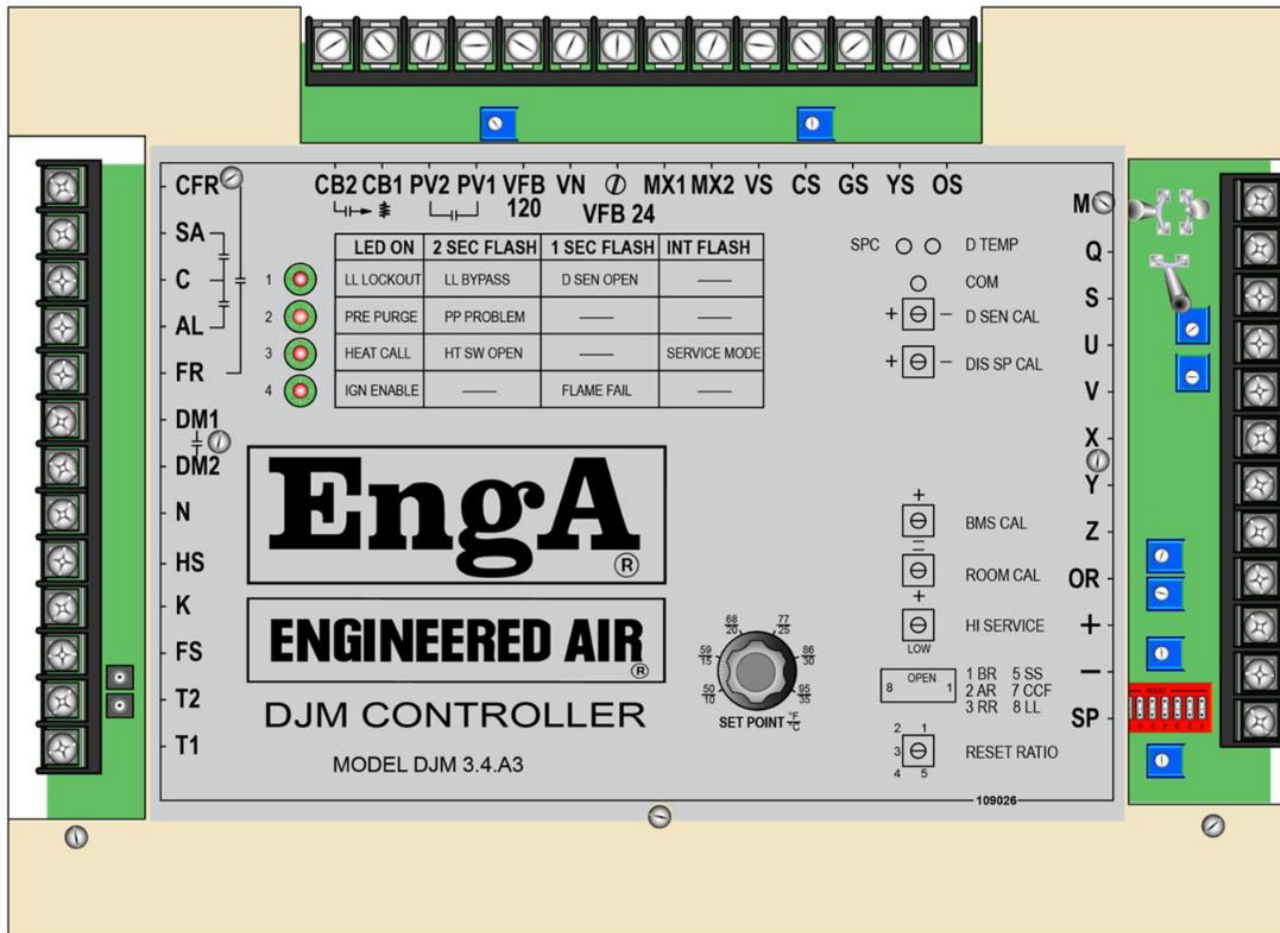
# Terminal operation.

Terminals GS, YS, OS.

GS, YS and OS, Combustion blower speed sensor input.  
0-60HZ.



# Terminal operation.

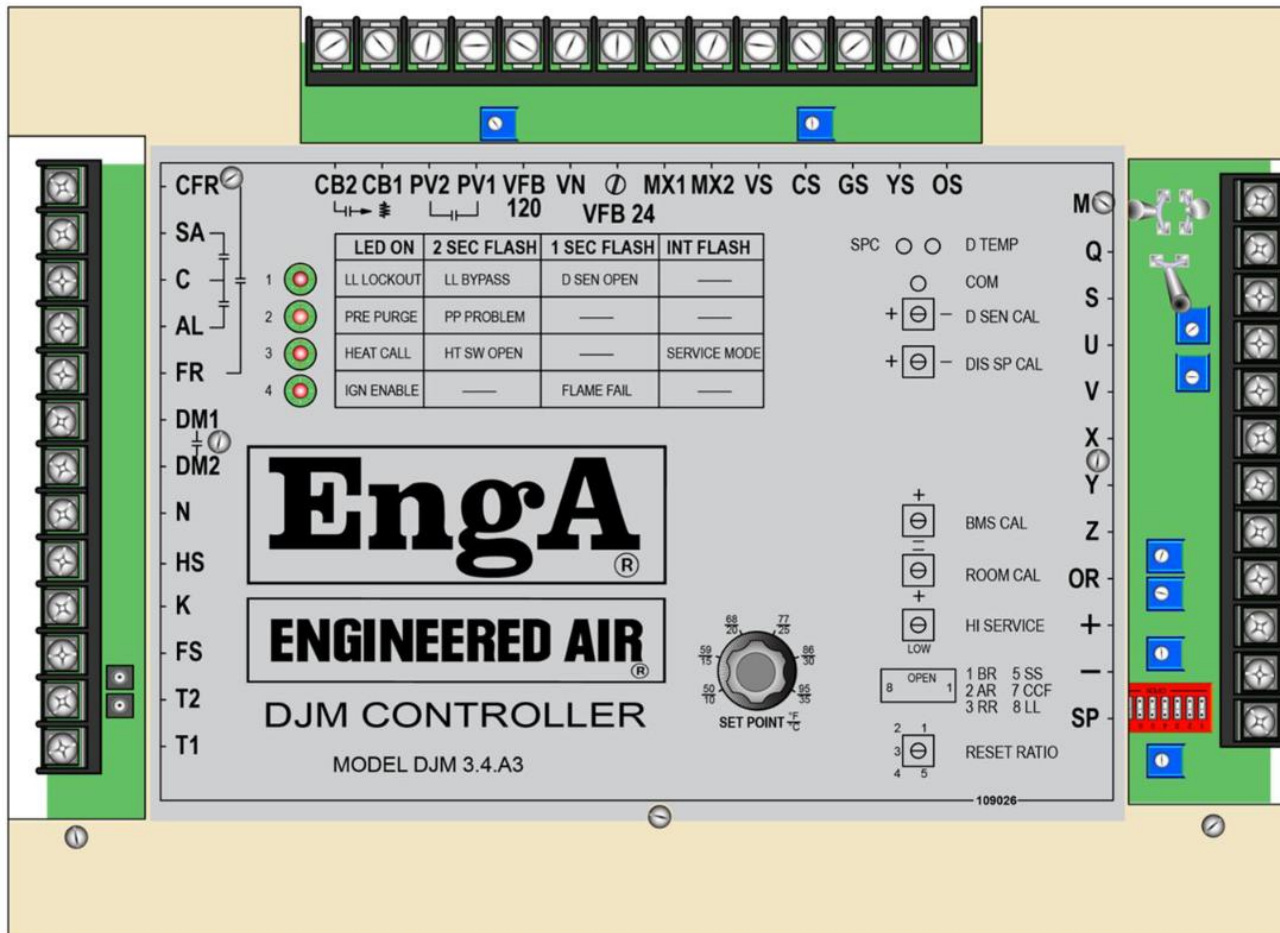


Terminals M,S,U.

If using TE6100-960 as a remote setpoint.



# Terminal operation.

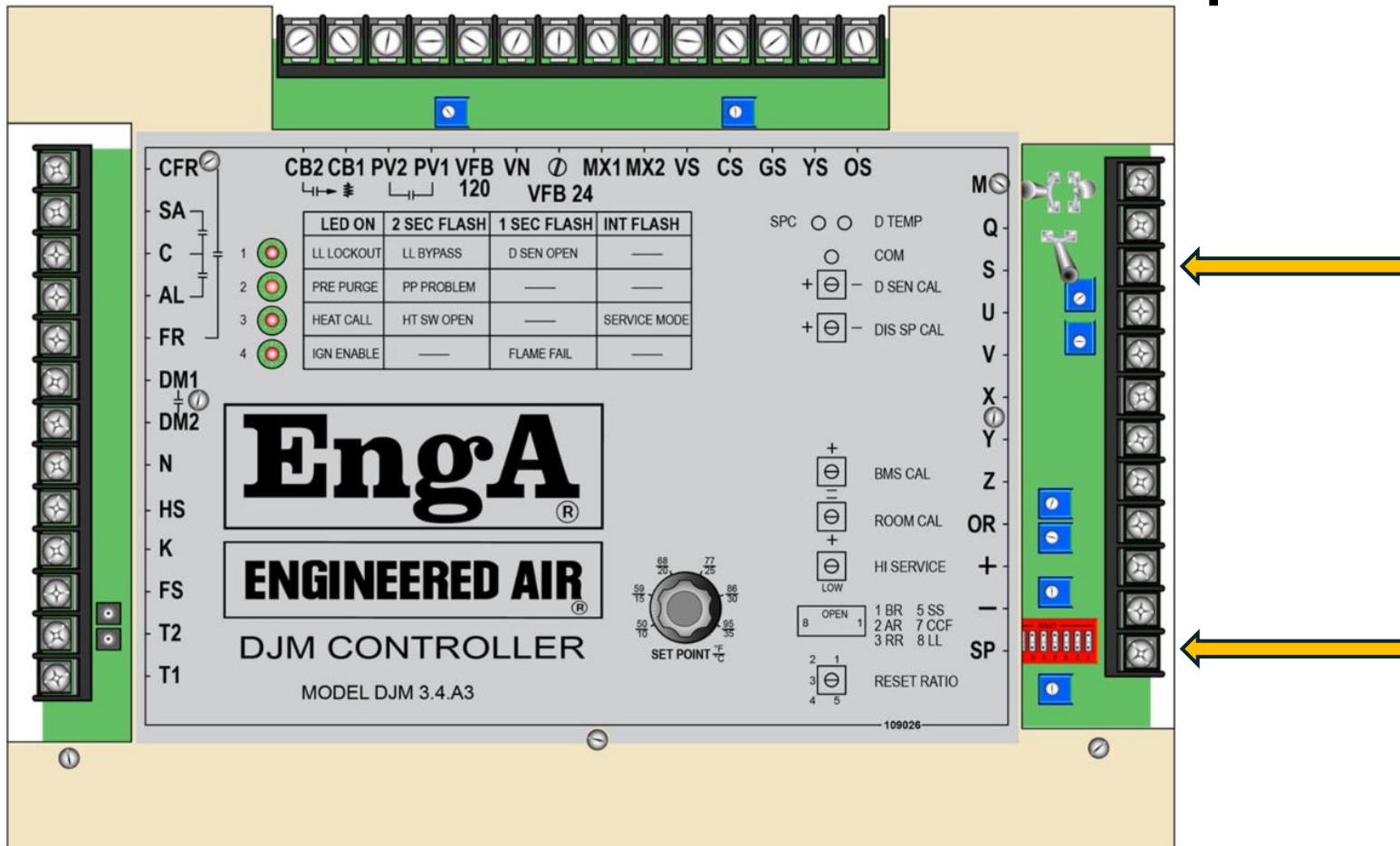


Terminals Q & U.

Discharge air temperature sensor.  
Two types of sensors can be used.  
Johnson TE6000 (not used anymore).  
Engineered Air TE6000-EA3.



# Terminal operation.

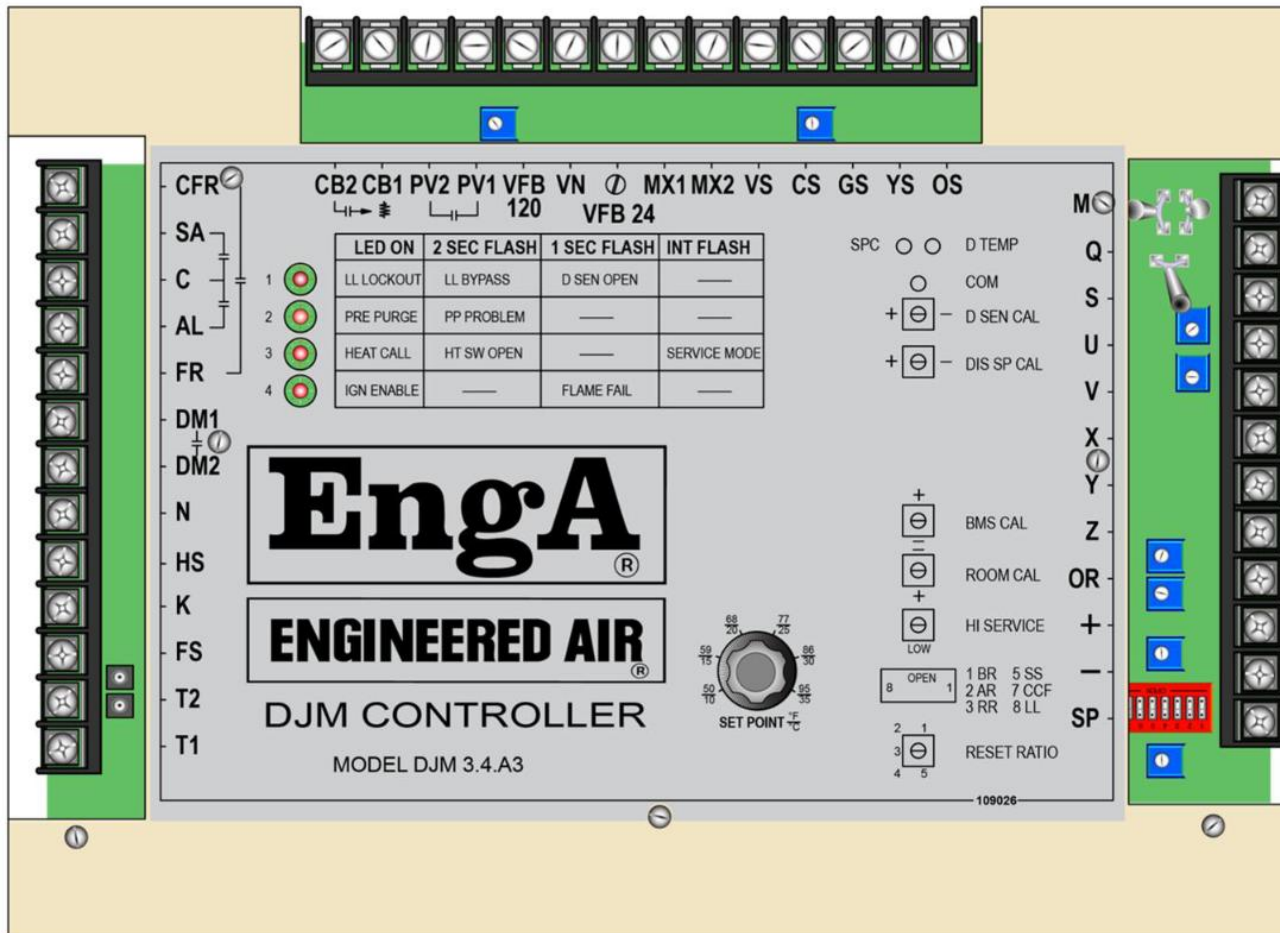


Terminals S & SP.

To activate the set point dial on DJM3, place a jumper across S and SP.



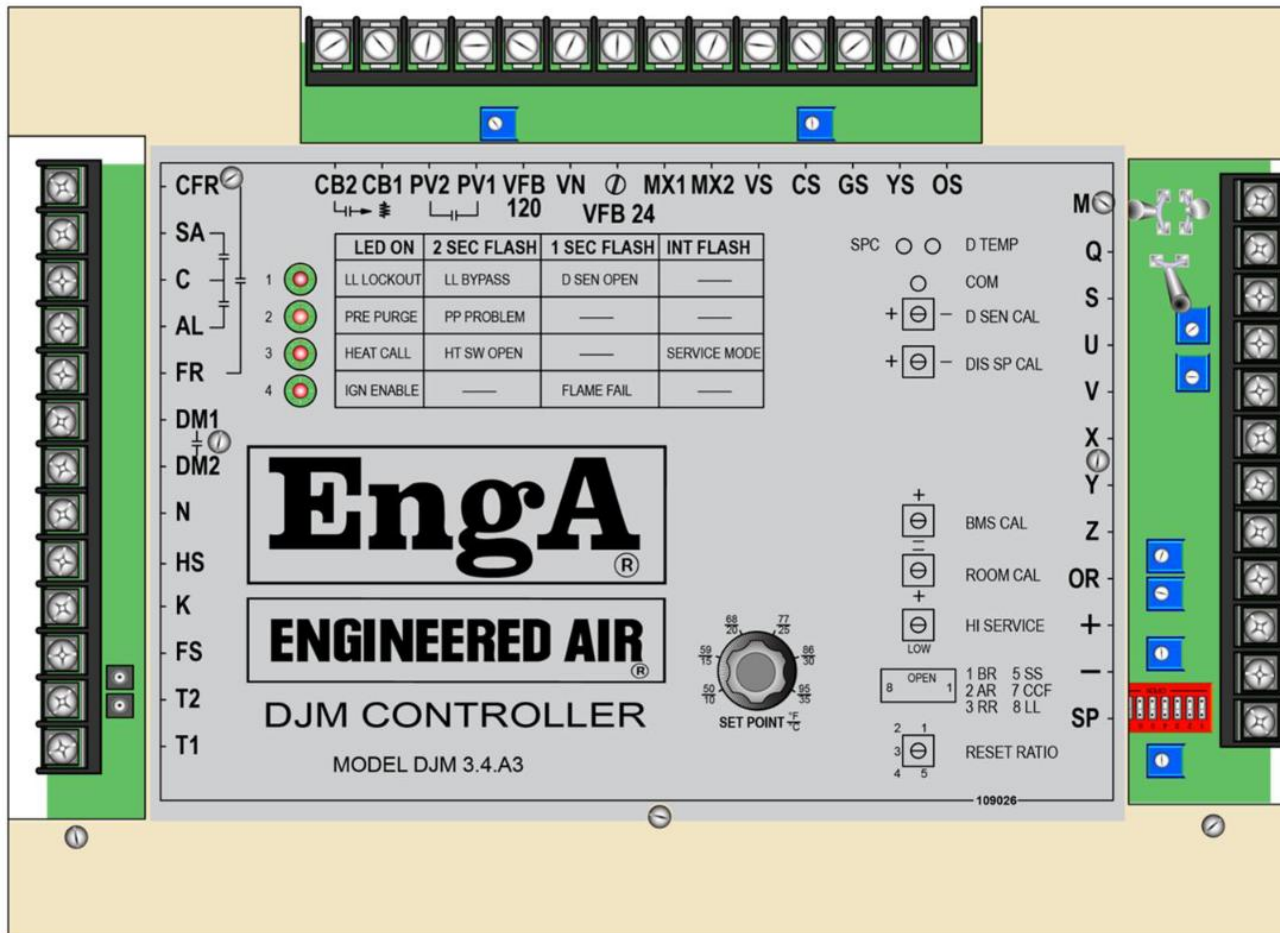
# Terminal operation.



Terminals V,X,Y,Z.  
Modulating( resistive) room/return  
air thermostat inputs.



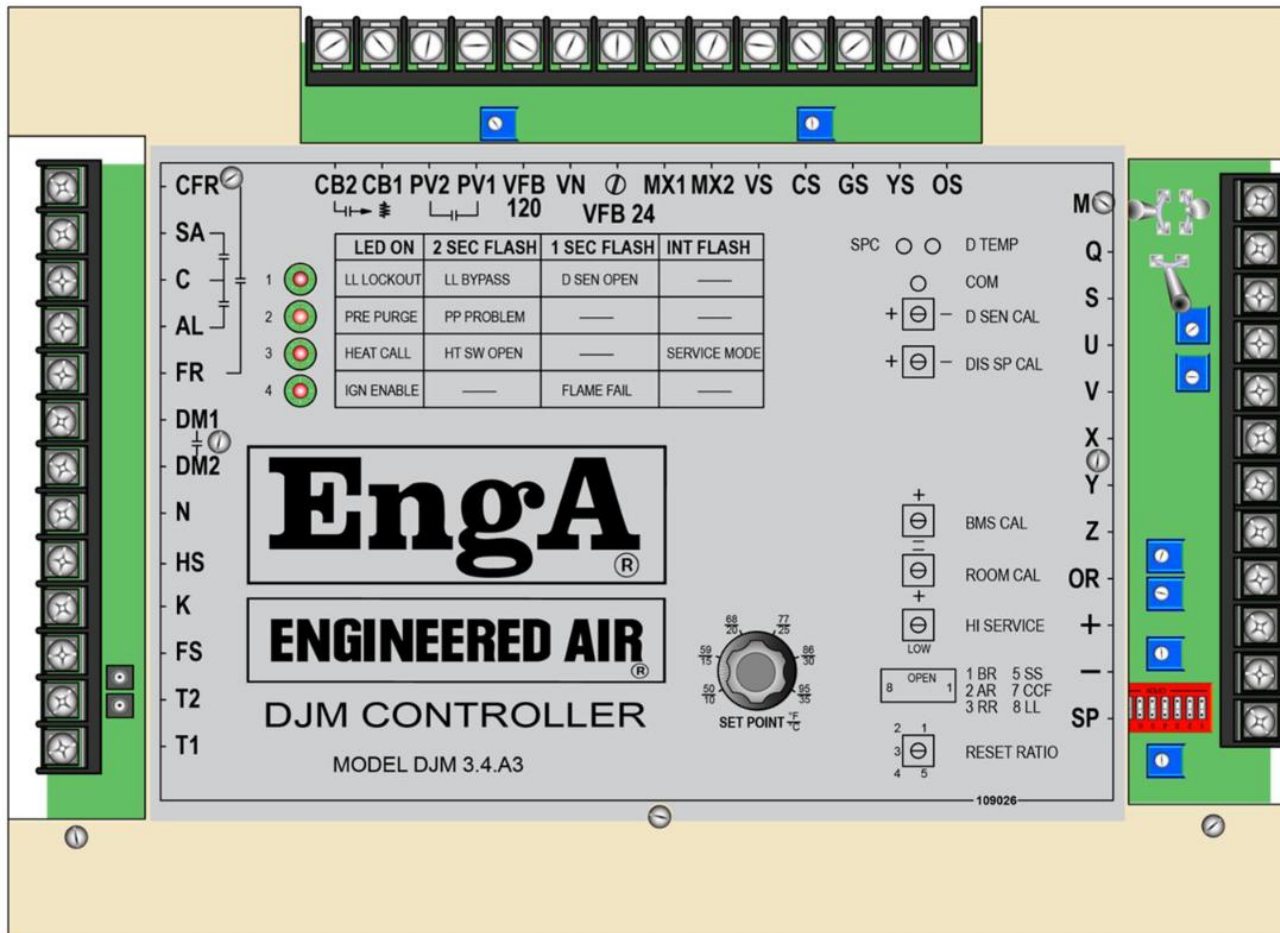
# Terminal operation.



Terminals OR.  
Single stage heat thermostat input.



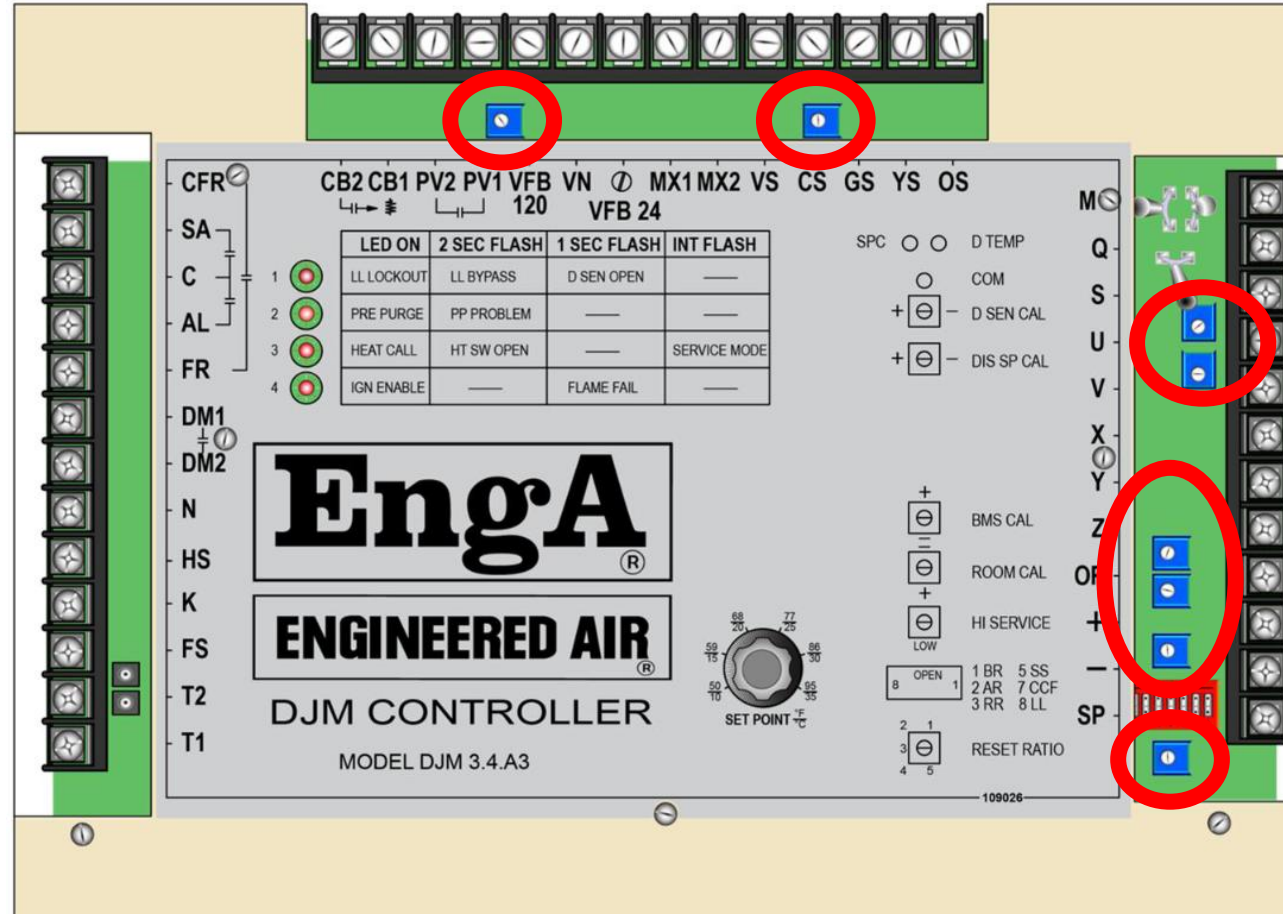
# Terminal operation.



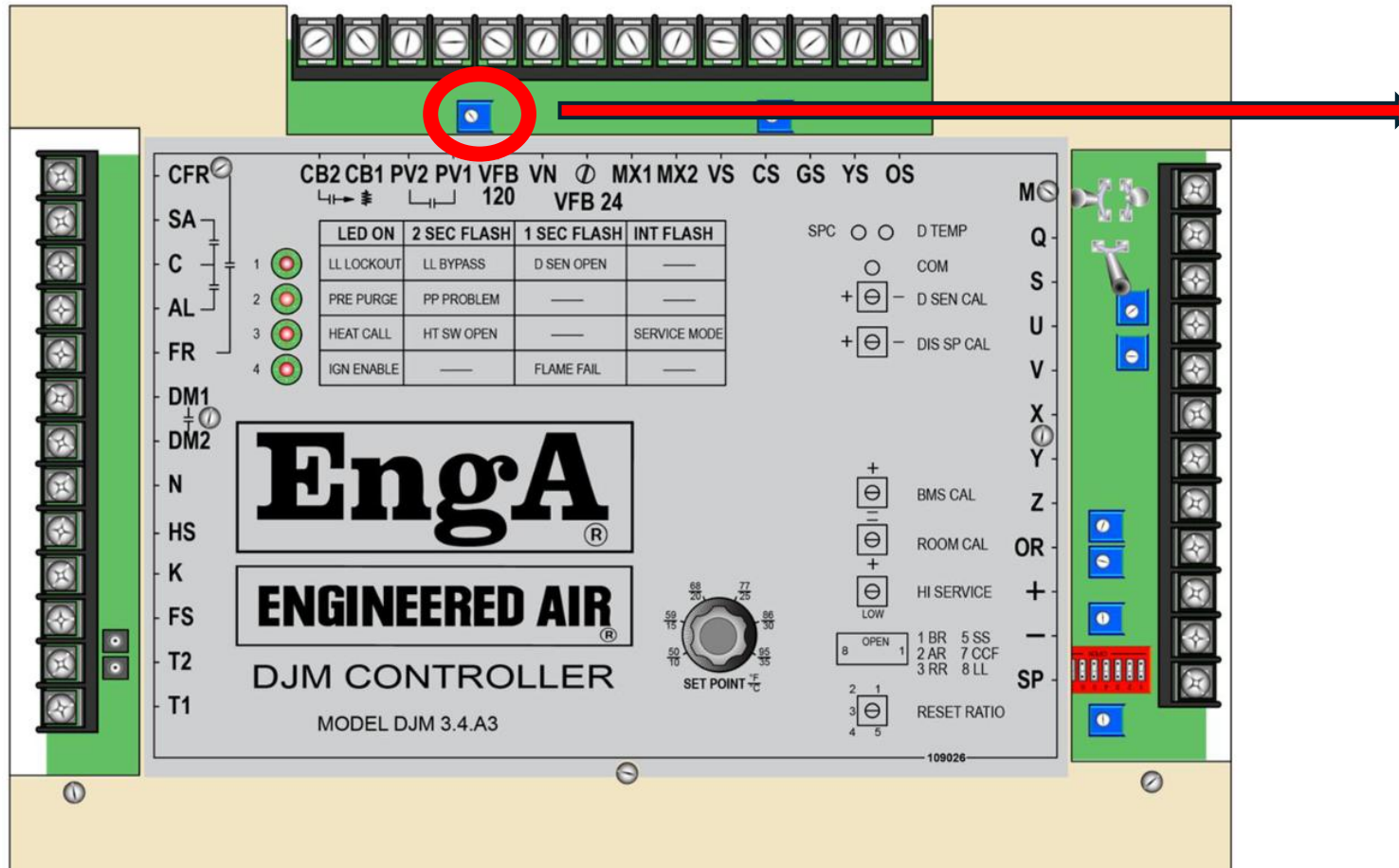
Terminals + & -.  
0-10vdc (4-20ma) temperature  
reset input.



# Adjustment pots.



# Burner adjustment pots.

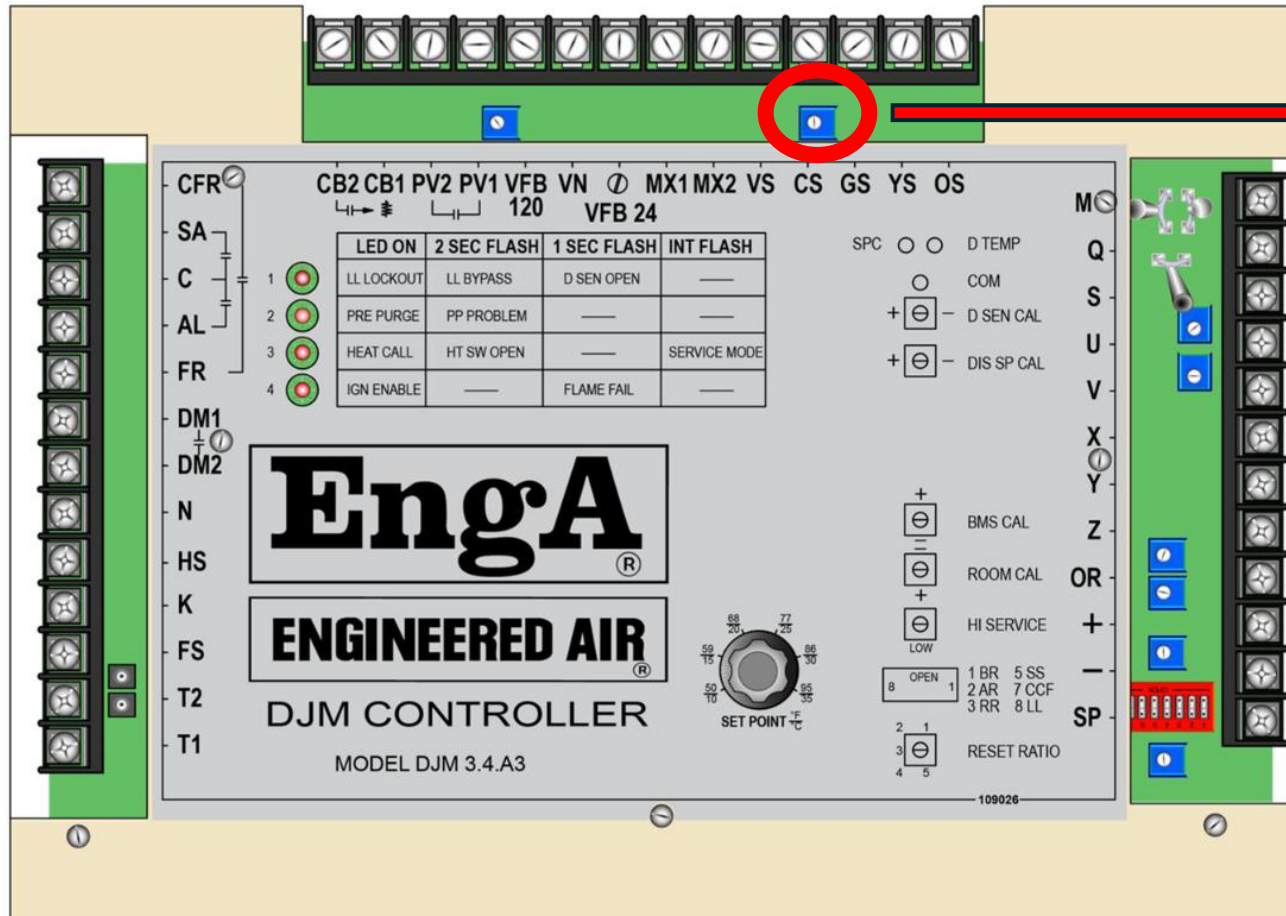


Low fire pot. (Located by terminal PV1).

- The low fire pot is to be adjusted by a qualified service technician only.
- This pot should only be adjusted when using a combustion analyzer.
- This is the low fire combustion blower speed RPM adjustment pot.
- The low fire pot is used to adjust the combustion air at low fire.
- The low fire speed is adjustable from 1150 to 1400 RPM for High turndown.
- 1800 to 2000 for standard burner.



# Burner adjustment pots.

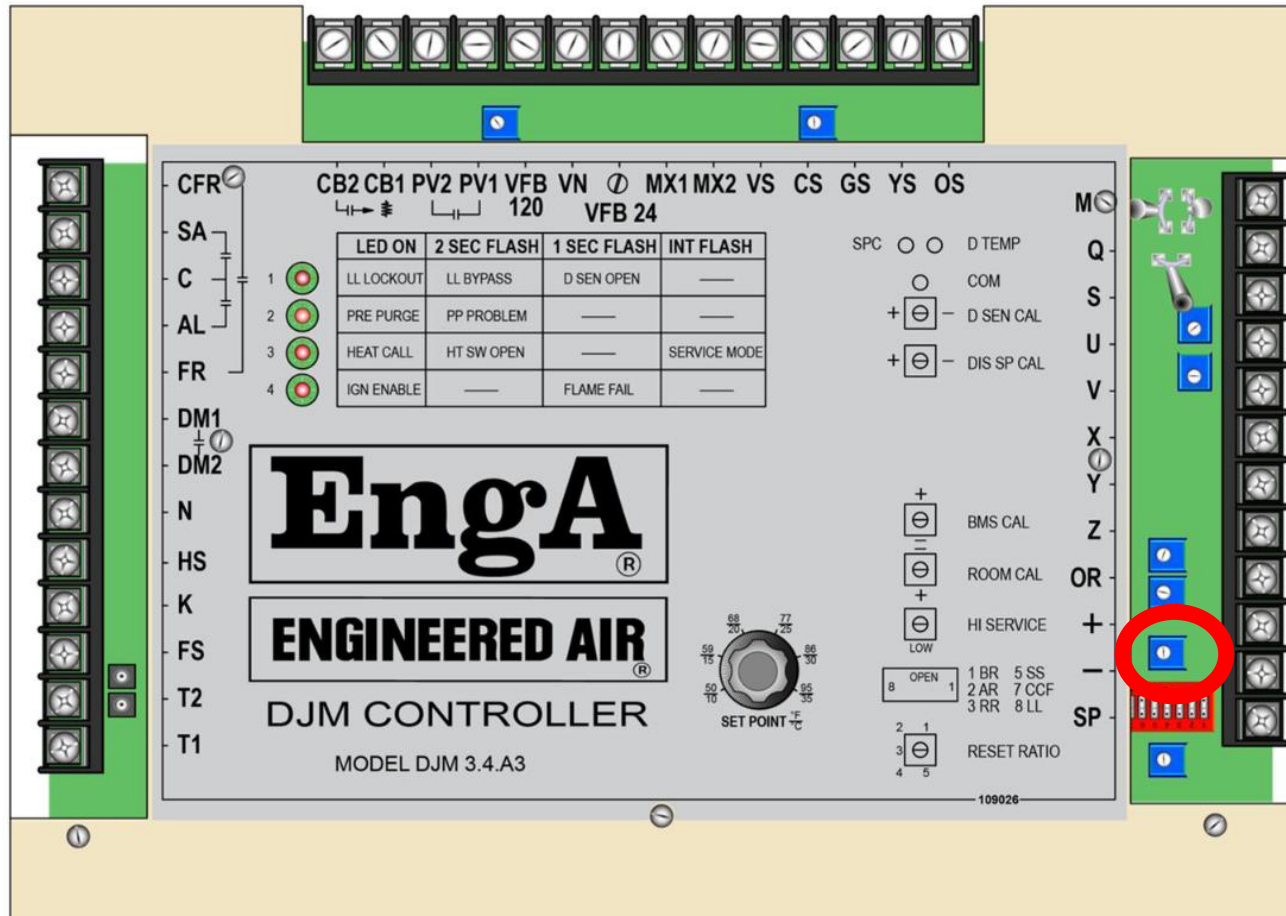


Curve matching pot.(Located by terminal CS).

- The curve matching pot is to be adjusted by a qualified service technician only.
- This pot should only be adjusted when using a combustion analyzer.
- This is the curve matching gas valve adjustment pot.
- The curve matching pot is used to adjust the VDC to the modulating valve during combustion setup.



# Burner adjustment pots.



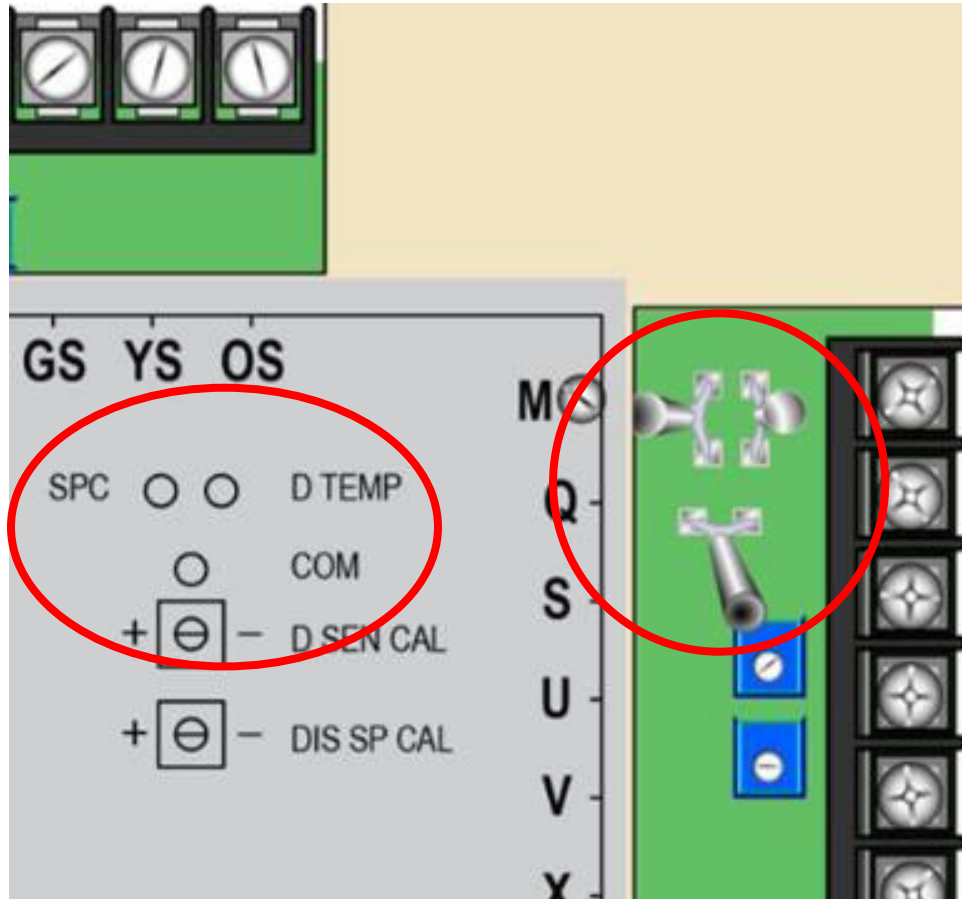
## HI Service pot.

(Located between terminals + & -).

- The HI Service pot is to be adjusted by a qualified service technician only.
- This pot should only be adjusted when using a combustion analyzer.
- This is the service mode pot.
- The HI SERVICE pot is designed to allow the service technician to manually set the burner firing rate they choose. Dip switch #5 must be on.
- Rotating the pot fully clockwise will set the burner to HIGH FIRE.
- Rotating the pot fully counterclockwise will set the burner to LOW FIRE.



# Temperature test pins.



Temperature test pins(Located by terminals M & Q).

- The test pins allow the service technician to measure the final calculated setpoint and the discharge temperature at the sensor.

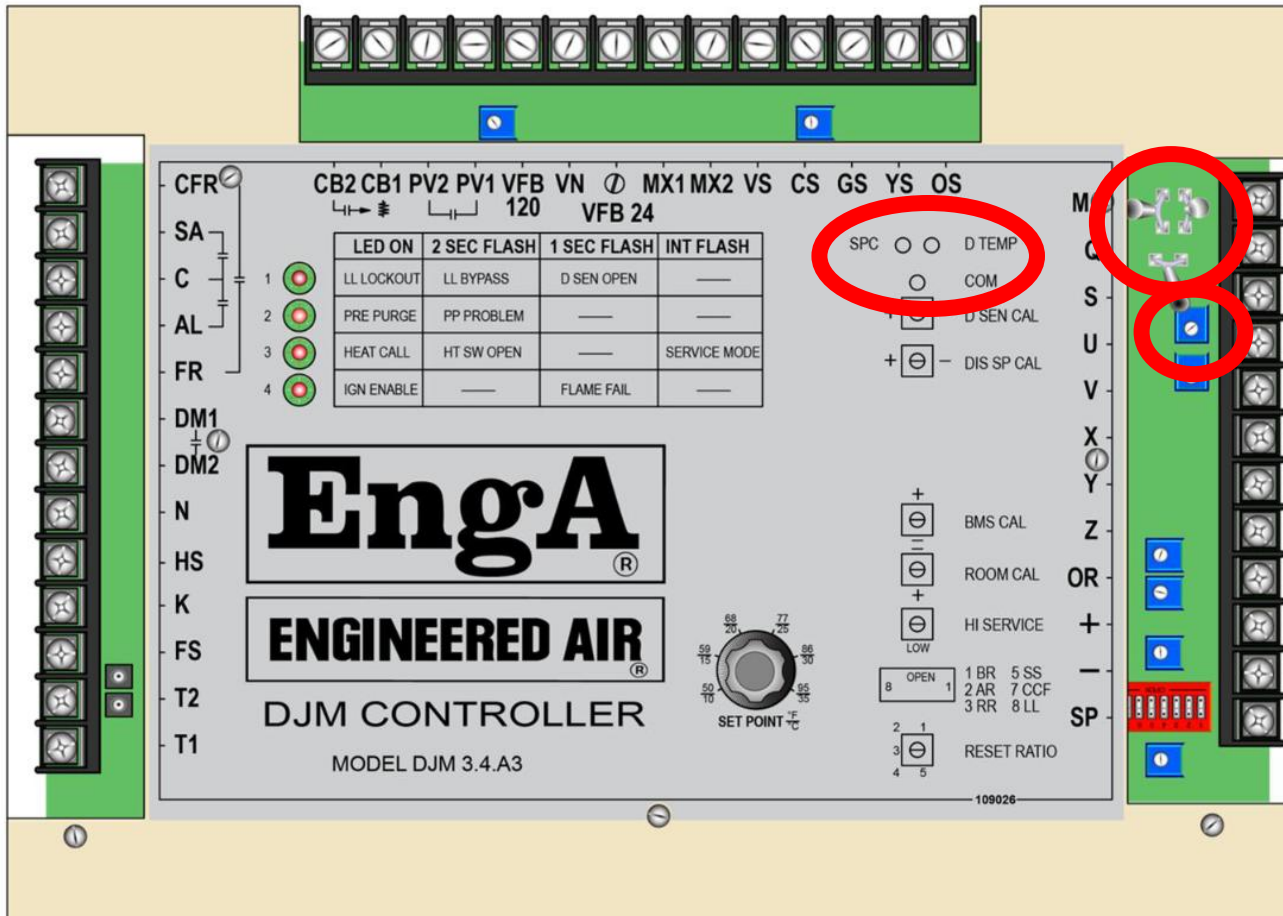
Temperature test pins (VDC, 1vdc=10C).

One voltmeter lead on COM the other lead on SPC. This will give you final calculated discharge setpoint.

One voltmeter lead on COM the other lead on D TEMP. This will give you the discharge temperature at the discharge sensor.



# Temperature control adjustment pots.

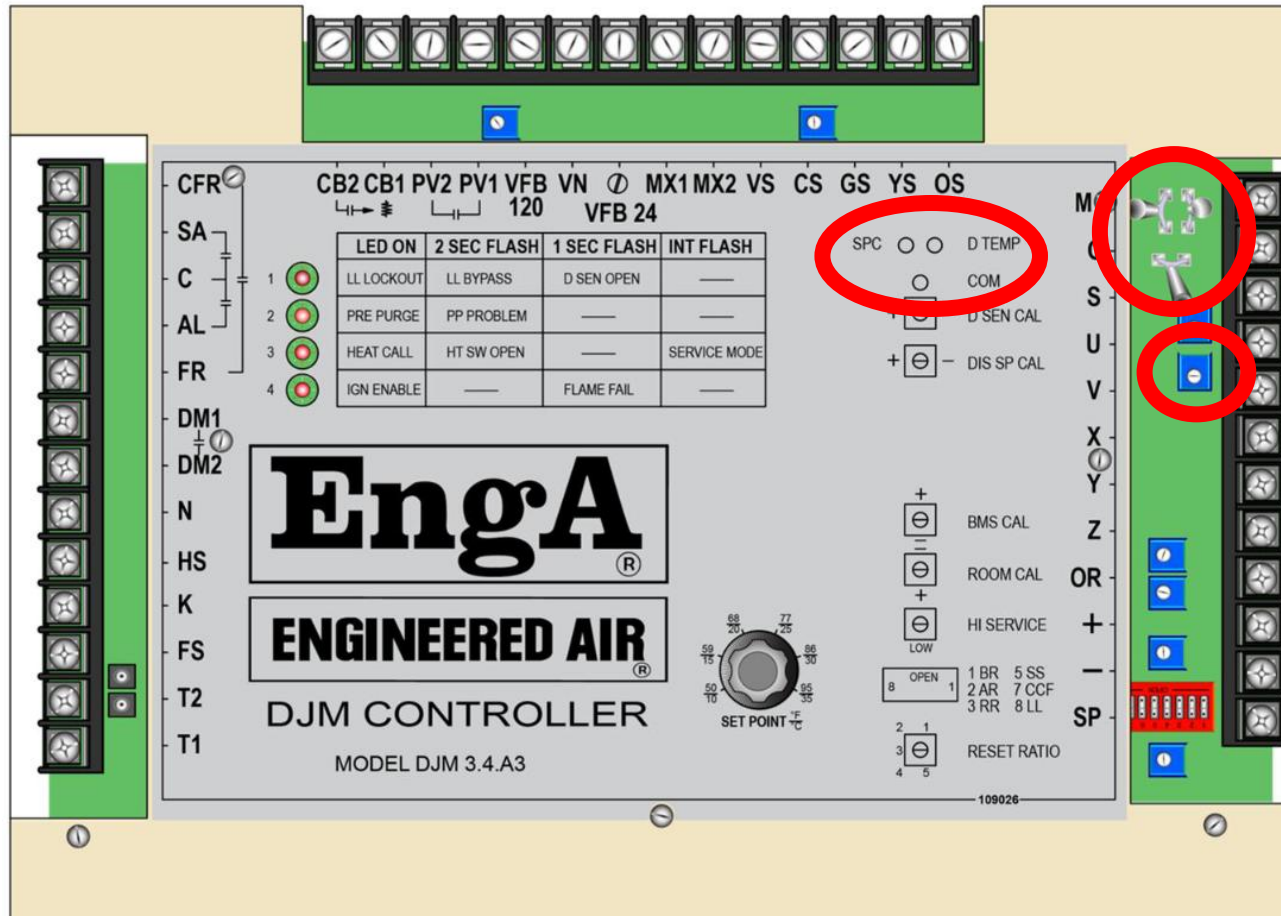


## Discharge sensor calibration. (D SEN CAL).

- This pot is used to calibrate the discharge air sensor.
- This pot is used in conjunction with the temperature test pins.



# Temperature control adjustment pots.

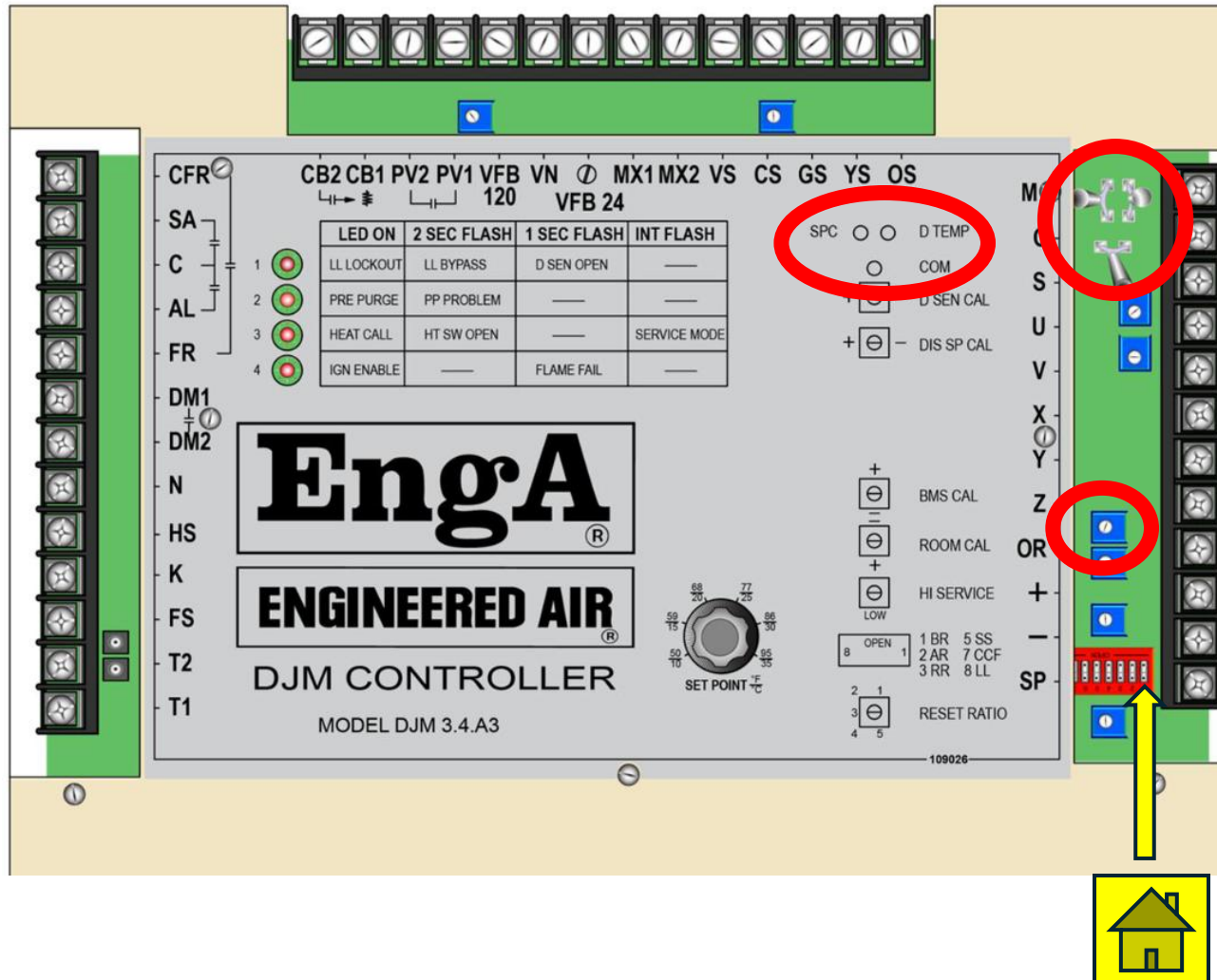


## Discharge setpoint calibration. (DIS SP CAL).

- This pot is used to calibrate the discharge air setpoint.
- This pot is used in conjunction with the temperature test pins.
- All discharge temperature reset dip switches must be in the 'OPEN' or off position to perform calibration.



# Temperature control adjustment pots.

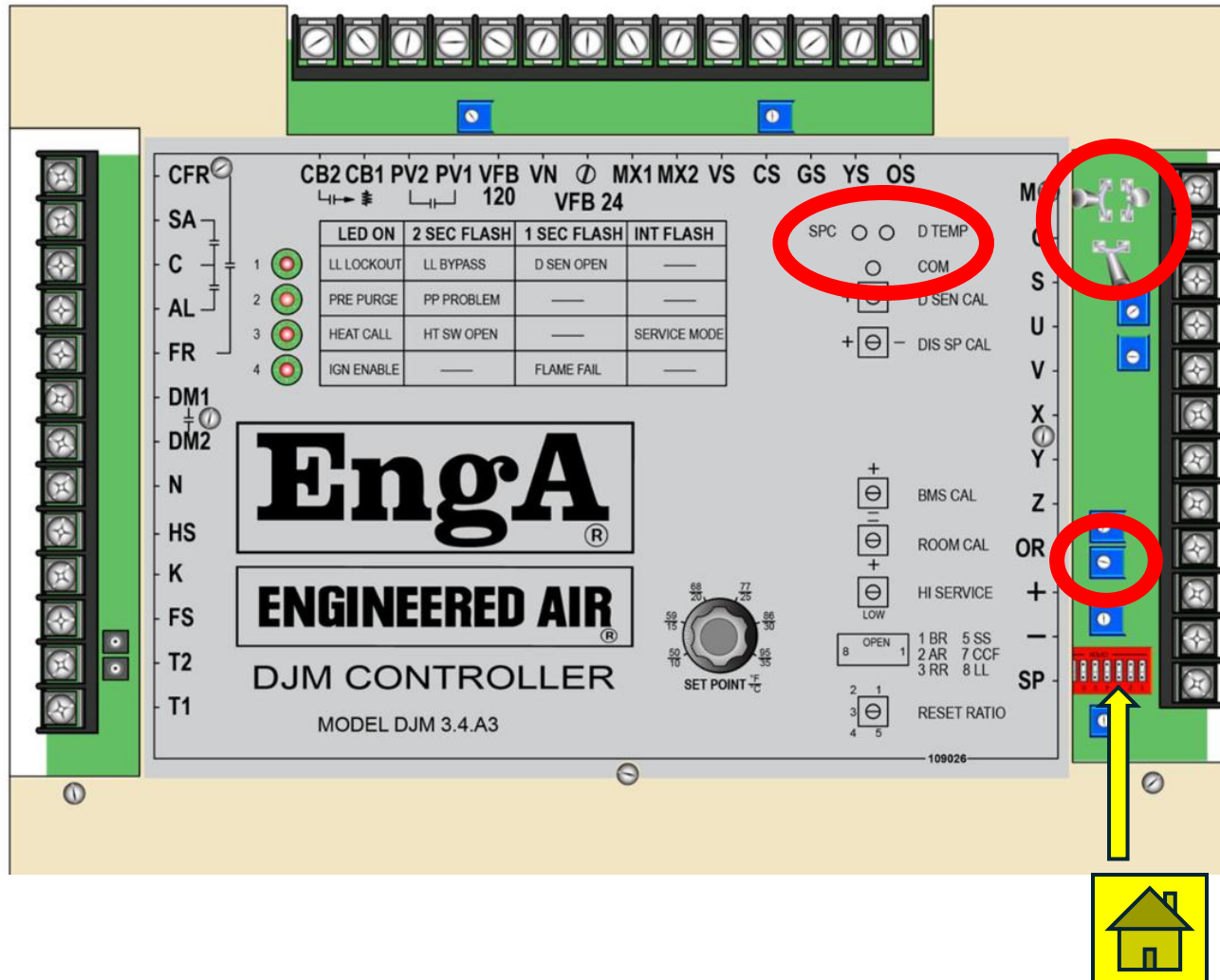


## BMS signal calibration. (BMS CAL).

- This pot is used to calibrate the discharge air reset setpoint.
- Stand alone setpoint must be calibrated first.

- 0-10vdc or 4-20ma signal required at terminals + and -.
- This pot is used in conjunction with the temperature test pins and dip switch #1.

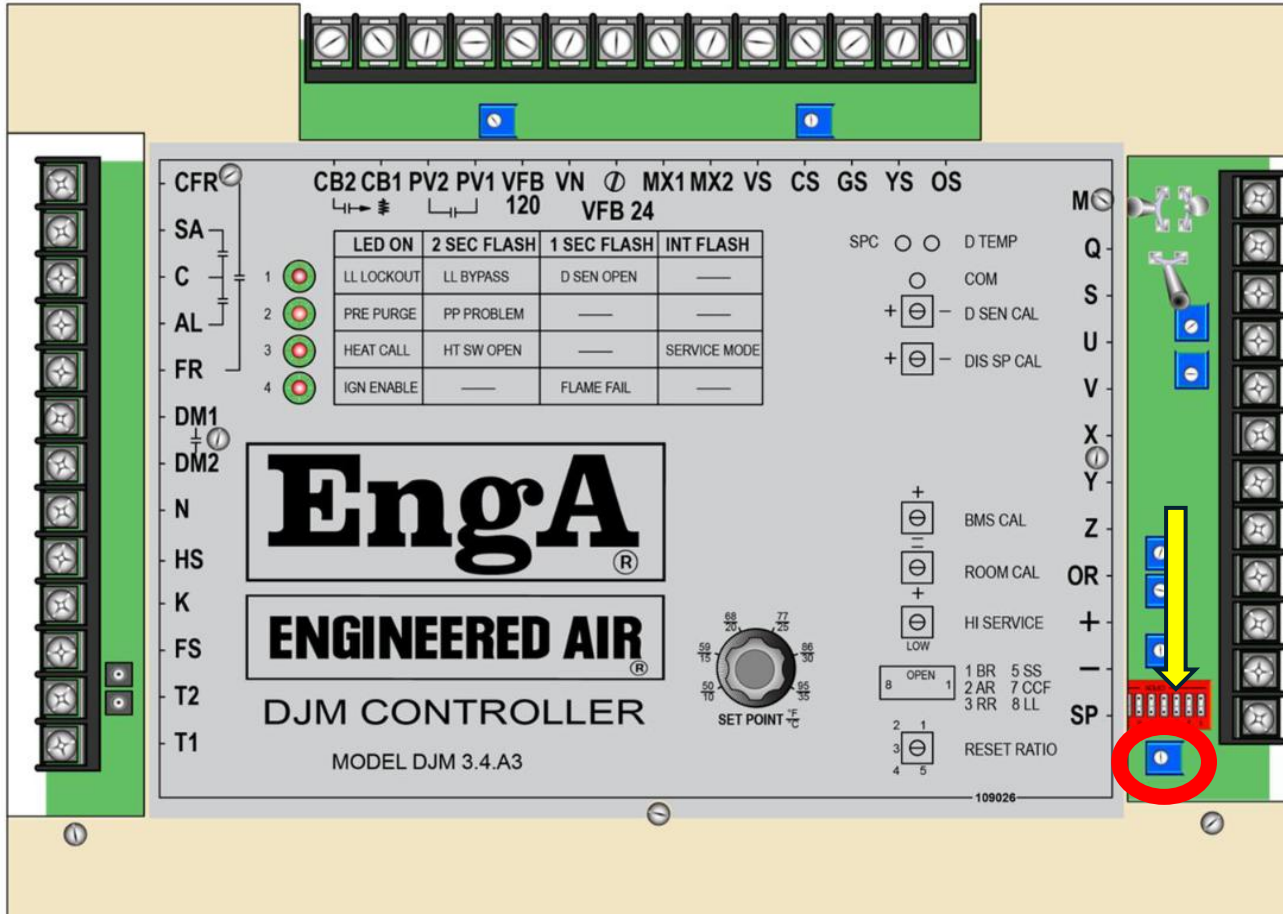
# Temperature control adjustment pots.



## Room sensor/setpoint calibration. (ROOM CAL).

- This pot is used to calibrate the discharge air reset setpoint.
- Terminals V,X,Y,Z.  
Modulating(resistive) room/return air thermostat inputs.
- Johnsons TE6100-960 room stat (not used anymore).
- Stand alone setpoint must be calibrated first.
- This pot is used in conjunction with the temperature test pins and dip switch #3.

# Temperature control adjustment pots.

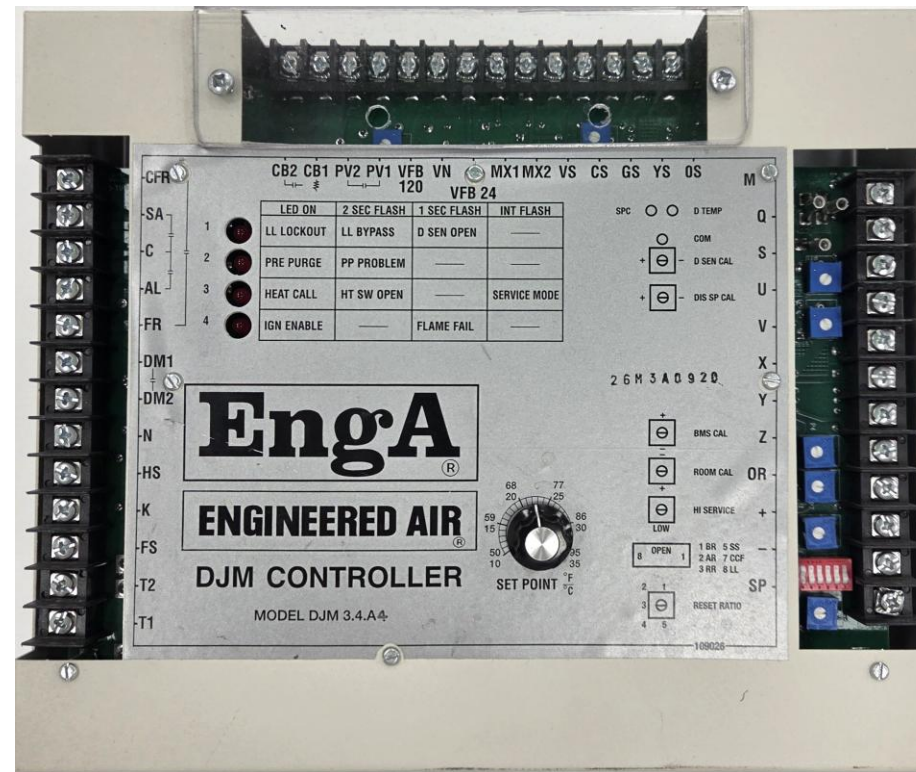


**Reset ratio adjustment pot. (RESET RATIO).**

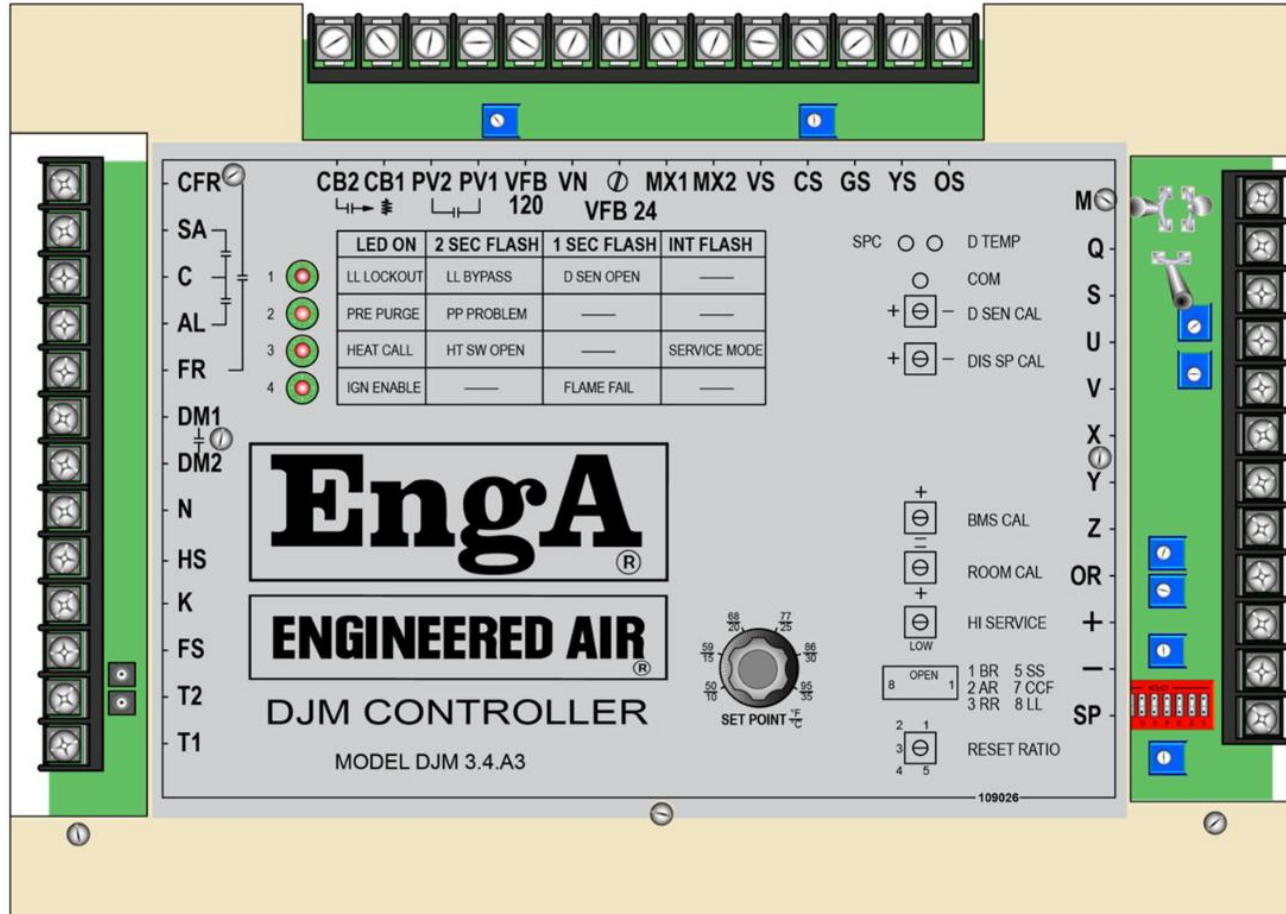
- This pot is used to set the reset band width based on a setpoint and pot position.



# Temperature control.



# Temperature control.



## Temperature control.

- The DJM3 is designed to be a discharge air temperature control.
- Stand alone temperature control (not modified by a remote signal, also know as 'reset').
- Stand alone control can be achieved two ways.
- 1, the face setpoint dial.
- 2, remote mounted setpoint dial.



## DJM3 set up sheet.

### DJM-3 SET UP SHEET

Job: \_\_\_\_\_ Tag: \_\_\_\_\_ Designer: \_\_\_\_\_ Model: \_\_\_\_\_ Date: \_\_\_\_\_

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                              |                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AUTO BYPASS LOWLIMIT</b><br>(rip switch #6)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                              | DISABLED OFF <input type="checkbox"/><br>ENABLED ON <input type="checkbox"/>                                                                                                                         |
| <b>APPLICATION</b><br>(rip switch #7)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | STANDARD (4 minutes maintain purge)<br>DOOR HEATER (constant maintain purge) | STANDARD OFF <input type="checkbox"/><br>DOOR HEAT ON <input type="checkbox"/>                                                                                                                       |
| <b>ROOM RESET</b><br>(rip switch #3)<br>1=21°F (11.7 °C) 2=27(15) 3=32(17.8) 4=44(24.4) 5=59(32.8)<br><i>(values are for 80°F setpoint- see R&amp;D manual for additional values)</i><br><b>NOTE:</b><br>- The reset is bi-directional.<br>- The numbers given are for total degrees of reset.                                                                                                                                                                                                                                                                                                                                     |                                                                              | DISABLED OFF <input type="checkbox"/><br>ENABLED ON <input type="checkbox"/><br>Reset Ratio Pot #5 <input type="text"/><br>Specify Amount (°F) <input type="text"/>                                  |
| <b>AMBIENT RESET</b><br>(rip switch #2)<br>1=10°F (5.6°C) 2=11(6.1) 3=13(7.2) 4=16(8.9) 5=21(11.7)<br>1=18°F (10°C) 2=20(11.1) 3=24(13) 4=30(16.7) 5=37(20.6)<br><b>NOTE:</b><br>- The reset is bi-directional with series resistor and effectively unidirectional for standard wiring.<br>- The numbers given are for total degrees of reset. The ambient temperature range through which the discharge temperature is reset is:<br>- Standard connection = 20°F to 70°F (up reset only)<br>- Series resistor = 10°F to 70°F (bi-directional - the discharge setpoint will equal the dial setpoint at an ambient of about 27.3°F) |                                                                              | DISABLED OFF <input type="checkbox"/><br>ENABLED ON <input type="checkbox"/><br>(Std)<br>120Ω Series Resistor<br>Reset Ratio Pot #5 <input type="text"/><br>Specify Amount (°F) <input type="text"/> |
| <b>VOLTAGE OR CURRENT RESET</b><br>(rip switch #1)<br>Reset amount 15°F (8.3°C) to 60°F (33.3°C)<br><b>NOTE:</b><br>- Voltage and current reset is in the up direction only.<br>- The numbers given are for total degrees of reset.                                                                                                                                                                                                                                                                                                                                                                                                |                                                                              | DISABLED OFF <input type="checkbox"/><br>ENABLED ON <input type="checkbox"/><br>Specify Amount (°F) <input type="text"/>                                                                             |
| <b>DISCHARGE SETPOINT</b><br><b>NOTE:</b><br>Depending on options, may have to be calculated to be midpoint of reset range                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                              | SETPOINT (°F) <input type="text"/>                                                                                                                                                                   |
| <b>BLOWER / DAMPER OPERATION</b><br>- The combination of energized light (L) and fan (F8) terminals set the blower and damper operation at night.<br><b>DAY (FS on, HS on)</b> <input type="checkbox"/><br>- Continuous Blower, Dampers Open, Disch. Control<br><b>NIGHT (FS off, HS on, K on)</b> <input type="checkbox"/><br>- Intermittent Blower, Dampers Closed, Room Control<br><b>ALTERNATE NIGHT OPERATION (FS, K terminals all energized, HS on or off)</b> <input type="checkbox"/><br>- Continuous Blower, Dampers Closed, Discharge Control w/ Room Reset                                                              |                                                                              |                                                                                                                                                                                                      |



# Temperature control face setpoint dial.

DISCHARGE SETPOINT

SETPOINT (°F)

**NOTE:**

– Depending on options, may have to be calculated to be midpoint of reset range.



# Face setpoint unit function page.

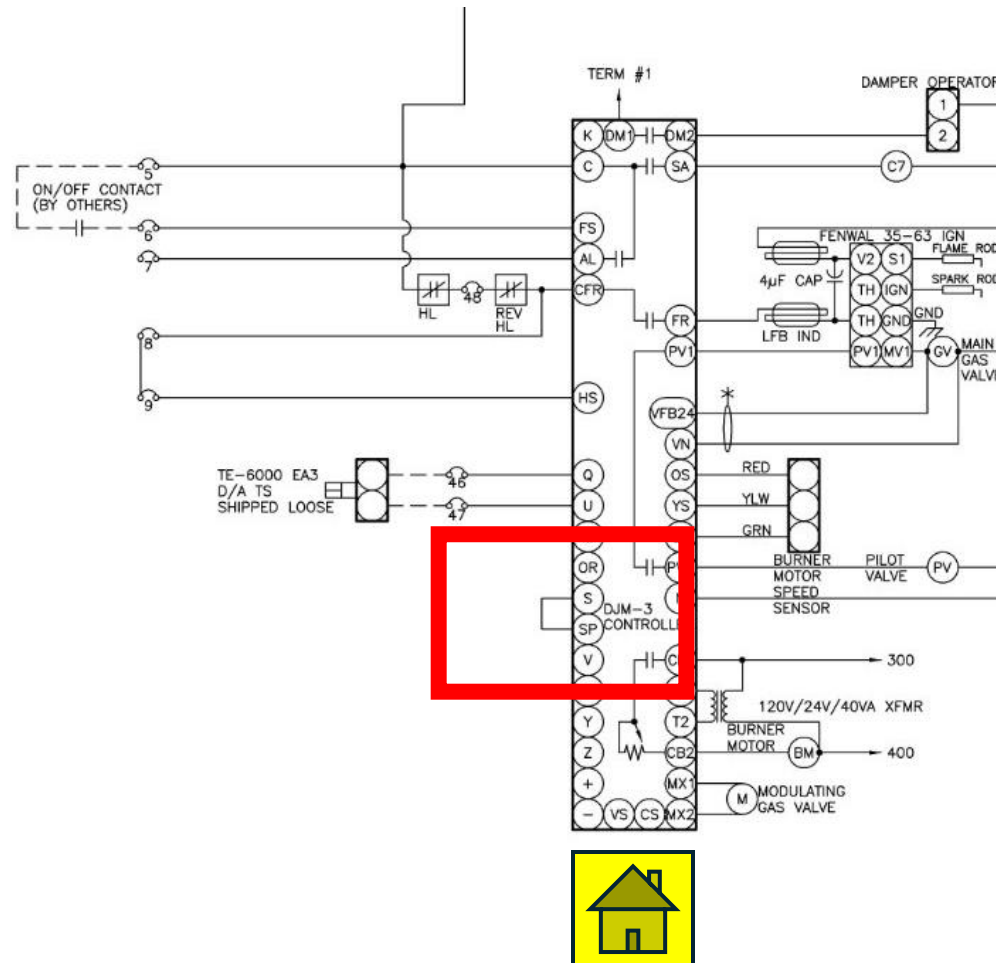
## UNIT FUNCTION

Disconnect switch 'on', service switch 'on', fire alarm contacts(by others) 'closed' (jumper if not required).

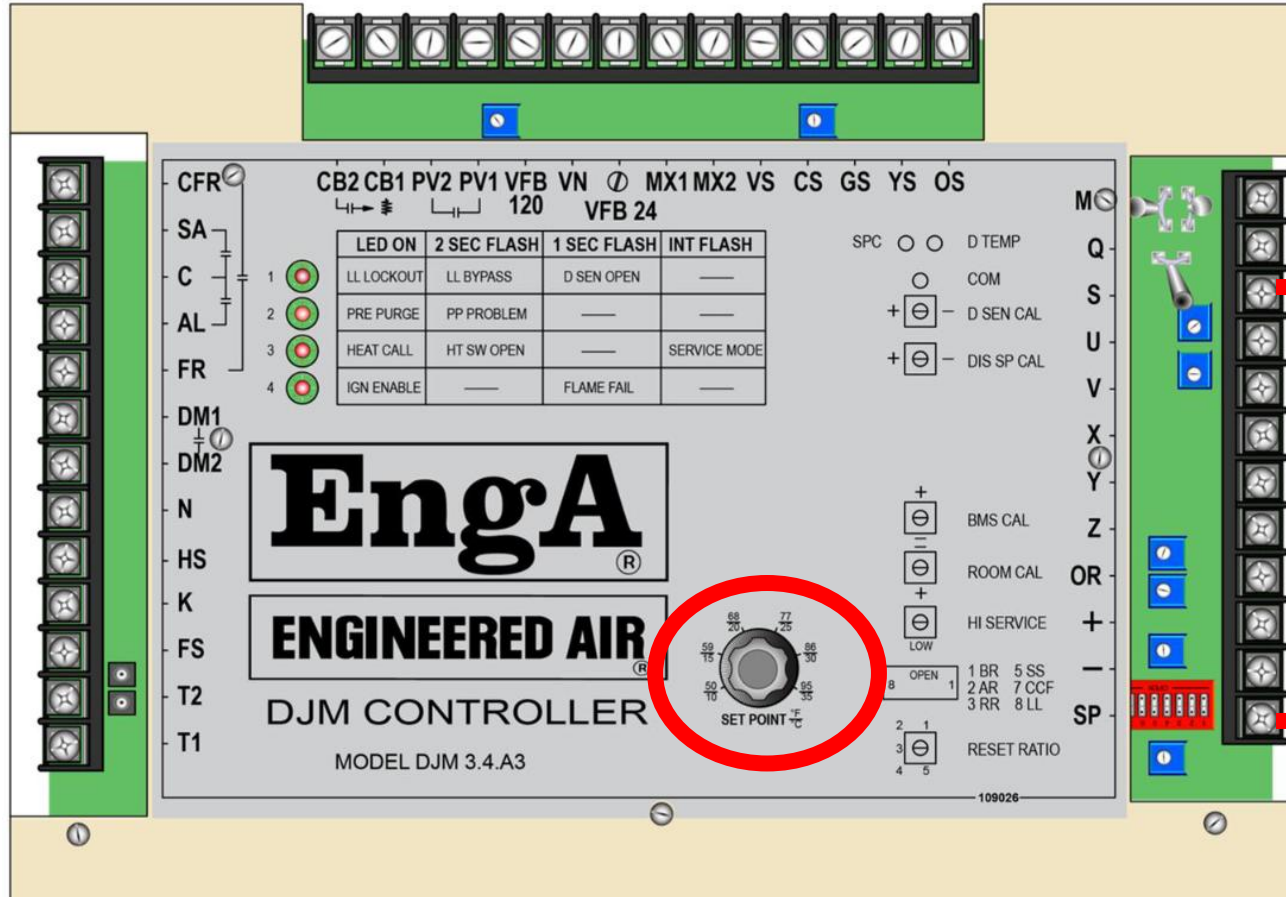
Unit on/off switch 'on', outside air damper opens. Blowers will delay on and run continuously. The DJM controller with an integral reference setpoint fixed at 75°F (23.9°C) will modulate the gas flow and combustion air to maintain the required discharge air temperature.



# Face setpoint unit wiring page.



# Temperature control face setpoint dial.



## Temperature control.

- To enable the stand-alone face setpoint dial, terminals S and SP must be jumped.



# Temperature control remote setpoint dial.

DISCHARGE SETPOINT

SETPOINT (°F)

**NOTE:**

– Depending on options, may have to be calculated to be midpoint of reset range.



# Remote setpoint unit function page.

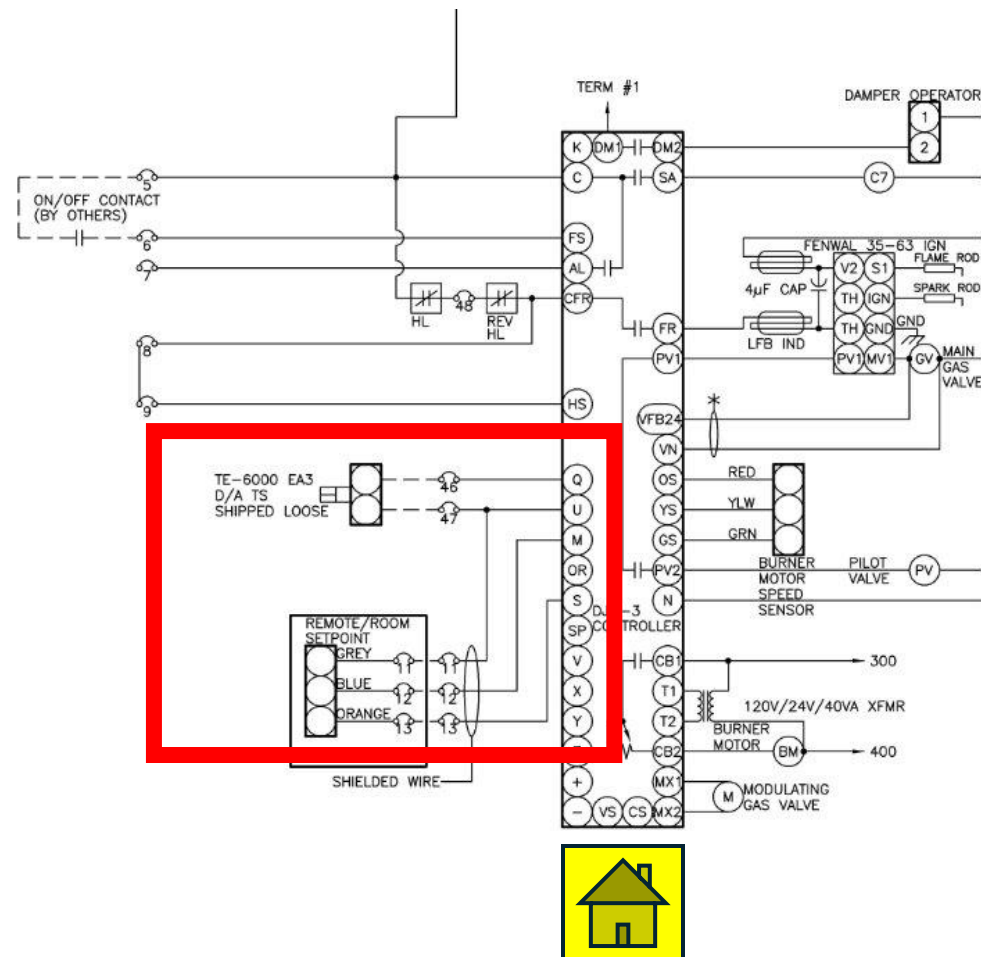
## UNIT FUNCTION

Disconnect switch 'on', service switch 'on', fire alarm contacts(by others) 'closed' (jumper if not required).

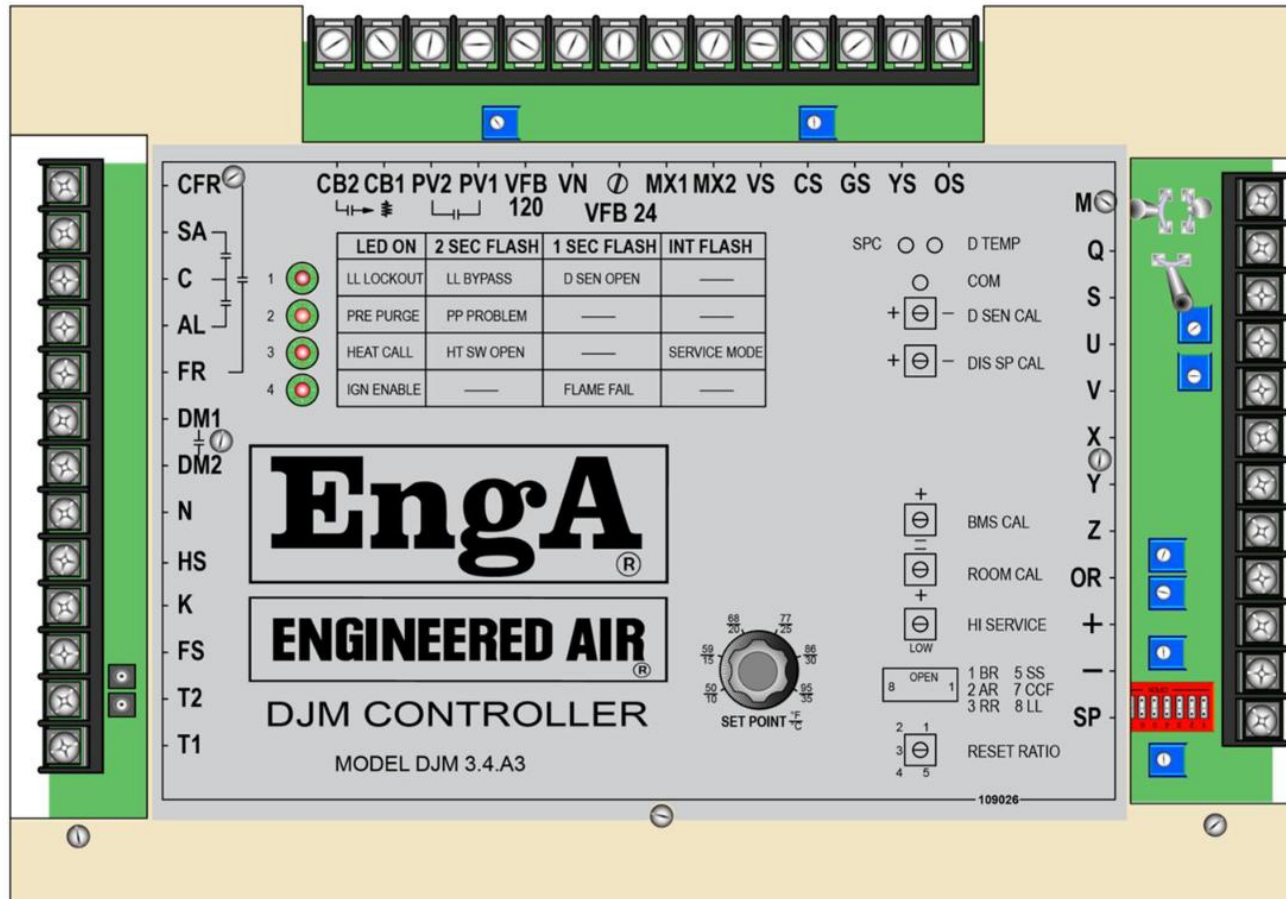
Unit on/off switch 'on', outside air damper opens. Blowers will delay on and run continuously. The DJM controller with an integral reference setpoint fixed at 75°F (23.9°C) will modulate the gas flow and combustion air to maintain the required discharge air temperature.



# Remote setpoint unit wiring page.



# Temperature control remote setpoint dial.

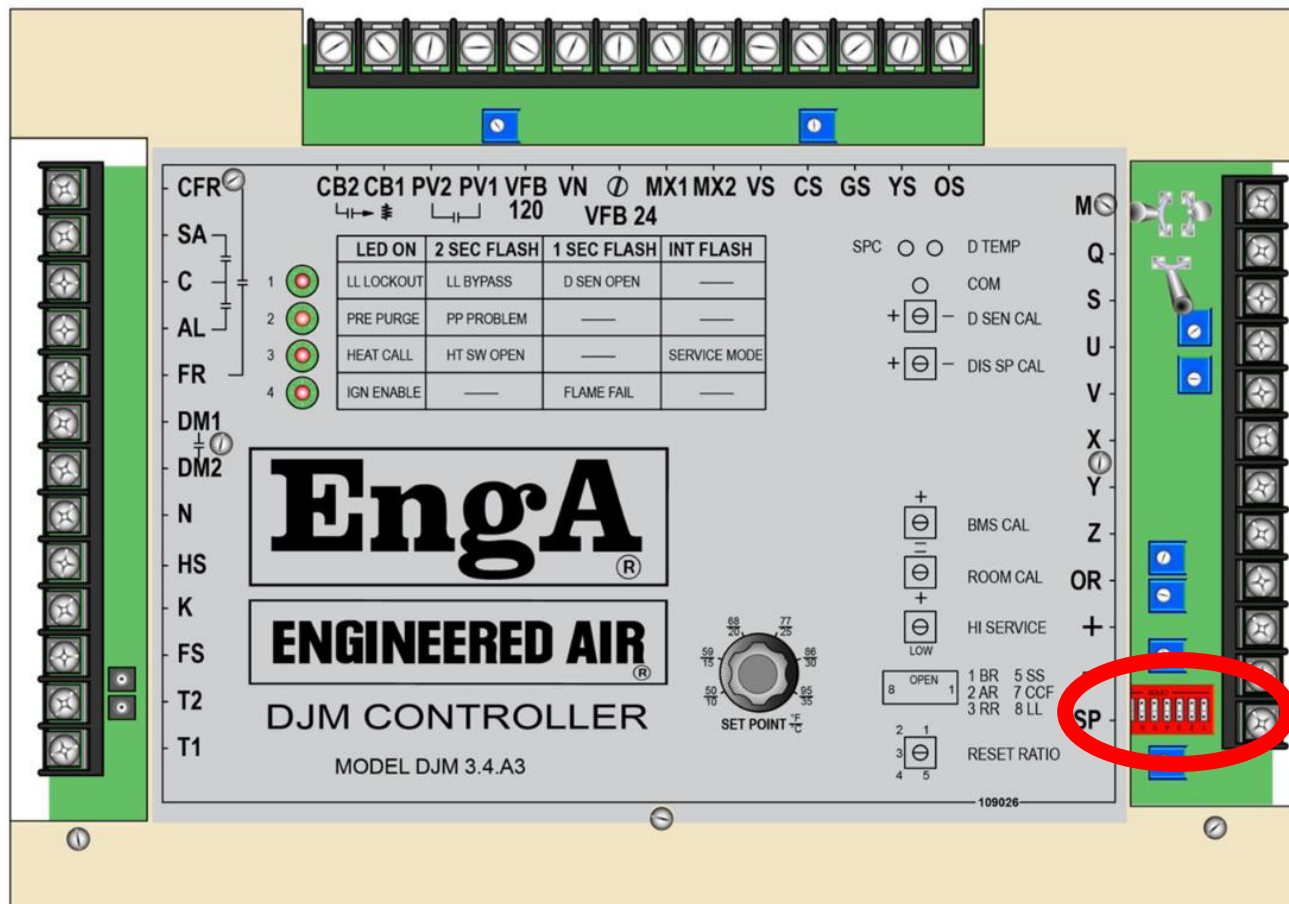


## Temperature control.

- To enable the remote setpoint dial, a Johnsons TE6100-960 room stat must be wired to terminal M,S,U.(This stat is not in use anymore.)



# Dip switches and discharge temperature resets.



## Dip switches.

- There is a total of eight dipswitches on the DJM3.
- The dipswitches are used to modify the base temperature setpoint by a using a remote signal to maintain the desired temperature. This is called reset.

| DIP SW | Description                                           |
|--------|-------------------------------------------------------|
| 1      | Enable Vdc or mA temperature reset if ON.             |
| 2      | Enable ambient reset if ON.                           |
| 3      | Enable room/return temperature reset if ON.           |
| 4      | Not used.                                             |
| 5      | Service mode (must be left OFF for normal operation). |
| 6      | Not used.                                             |
| 7      | Constant combustion air purge mode if ON.             |
| 8      | Enable low limit discharge temperature sensing if ON  |



# Dip switch #1 Voltage or current reset.

VOLTAGE OR CURRENT RESET

(dip switch #1)

Reset amount 15°F (8.3°C) to 60°F (33.33°C)

**NOTE:**

- Voltage and current reset is in the up direction only.
- The numbers given are for total degrees of reset.

DISABLED OFF ☐

ENABLED ON ☐

Specify Amount (°F)



# BMS reset unit function page.

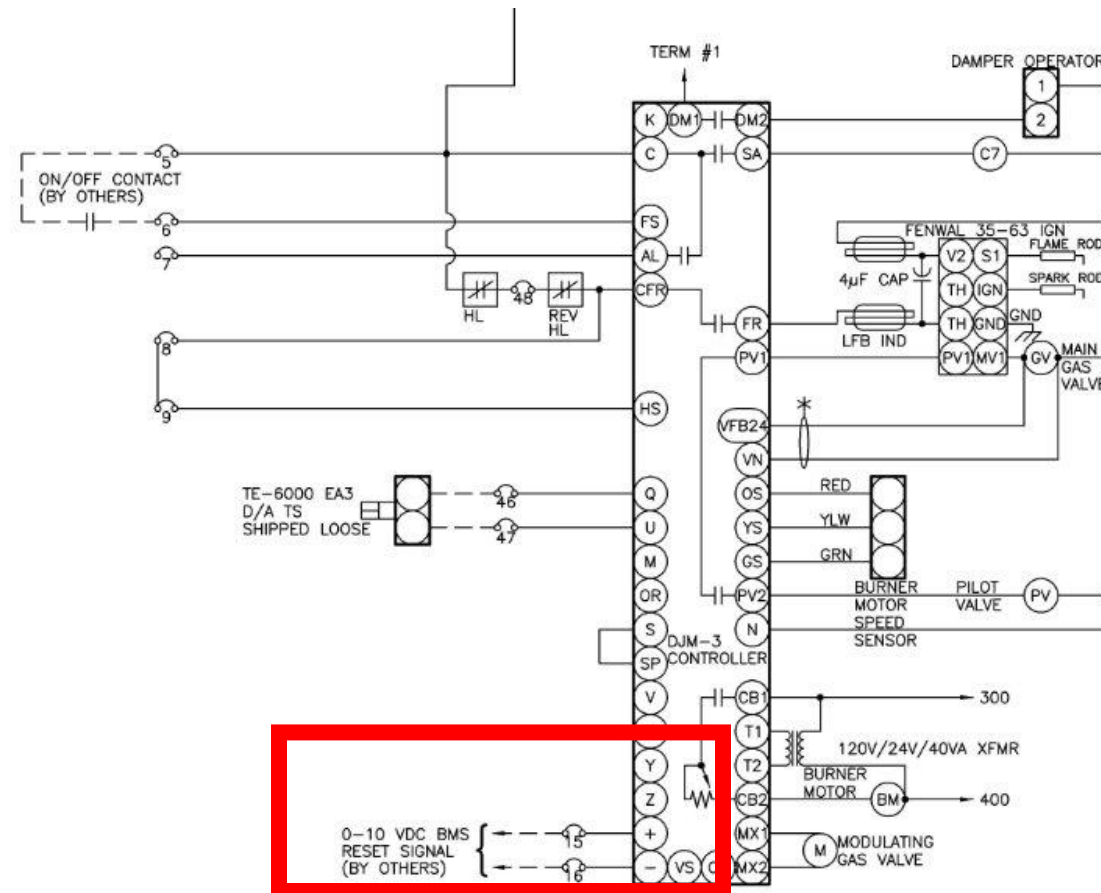
## UNIT FUNCTION

Disconnect switch 'on', service switch 'on', fire alarm contacts(by others) 'closed' (jumper if not required).

Unit on/off switch 'on', outside air damper opens. Blowers will delay on and run continuously. The DJM controller with an integral setpoint fixed at 68°F (20°C) will modulate the gas flow and combustion air to maintain the required discharge air temperature. The discharge air temperature will be reset proportionally from 68°F (20°C) to 96°F (35.6°C) as the BMS signal(by others) increases from 0-10vDC.



# BMS reset wiring page.

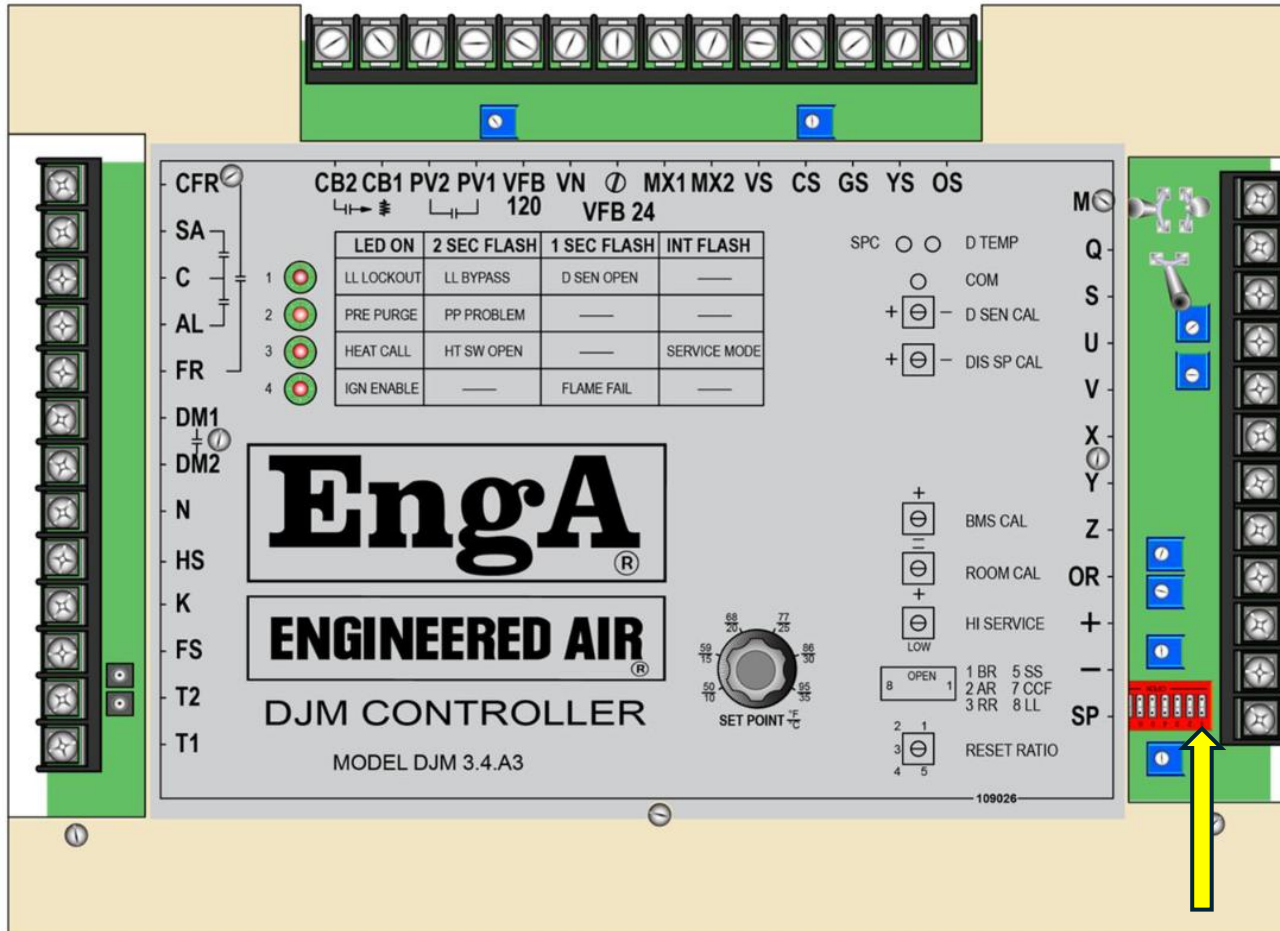


# BMS reset.

## BMS reset.

- Dip switch #1 on.
- Requires a 0-10vdc or 4-20ma signal to terminals + and -.

| Current Reset | Voltage Reset | Calculated Setpoint |    |
|---------------|---------------|---------------------|----|
|               |               | °C                  | °F |
| mA            | Vdc           |                     |    |
| -             | 0             | 13                  | 55 |
| 3             | 3             | 13.5                | 56 |
| 5             | 4             | 14.5                | 58 |
| 12            | 6             | 16                  | 61 |
| -             | 7             | 18                  | 65 |
| 16            | 8             | 20                  | 68 |
| -             | 9             | 23                  | 75 |
| 20            | 10            | 26                  | 79 |



# Dip switch #2 Ambient reset.

## AMBIENT RESET

(dip switch #2)

1=10°F (5.6°C) 2=11(6.1) 3=13(7.2) 4=16(8.9) 5=21(11.7)

1=18°F (10°C) 2=20(11.1) 3=24(13) 4=30(16.7) 5=37(20.6)

### NOTE:

- The reset is bi-directional with series resistor and effectively unidirectional for standard wiring.
- The numbers given are for total degrees of reset. The ambient temperature range through which the discharge temperature is reset is:
  - Standard connection = 20°F to 70°F (up reset only)
  - Series resistor= -15°F to 70°F (bi-directional - the discharge setpoint will equal the dial setpoint at an ambient of about 27.5°F).

DISABLED OFF ☐

ENABLED ON ☐

(Std)

120Ω Series Resistor

Reset Ratio Pot #5

Specify Amount (°F)



# Ambient reset unit function page.

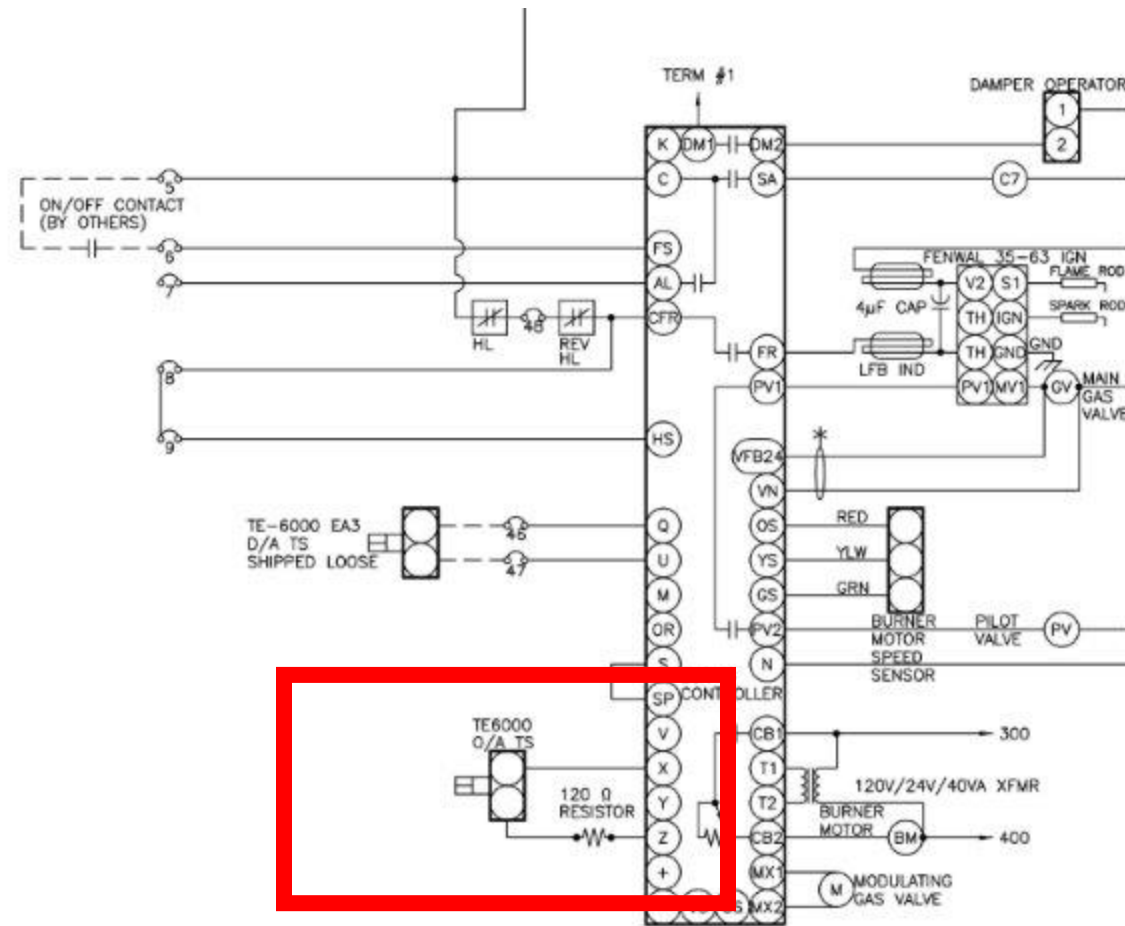
## UNIT FUNCTION

Disconnect switch 'on', service switch 'on', fire alarm contacts(by others) 'closed' (jumper if not required).

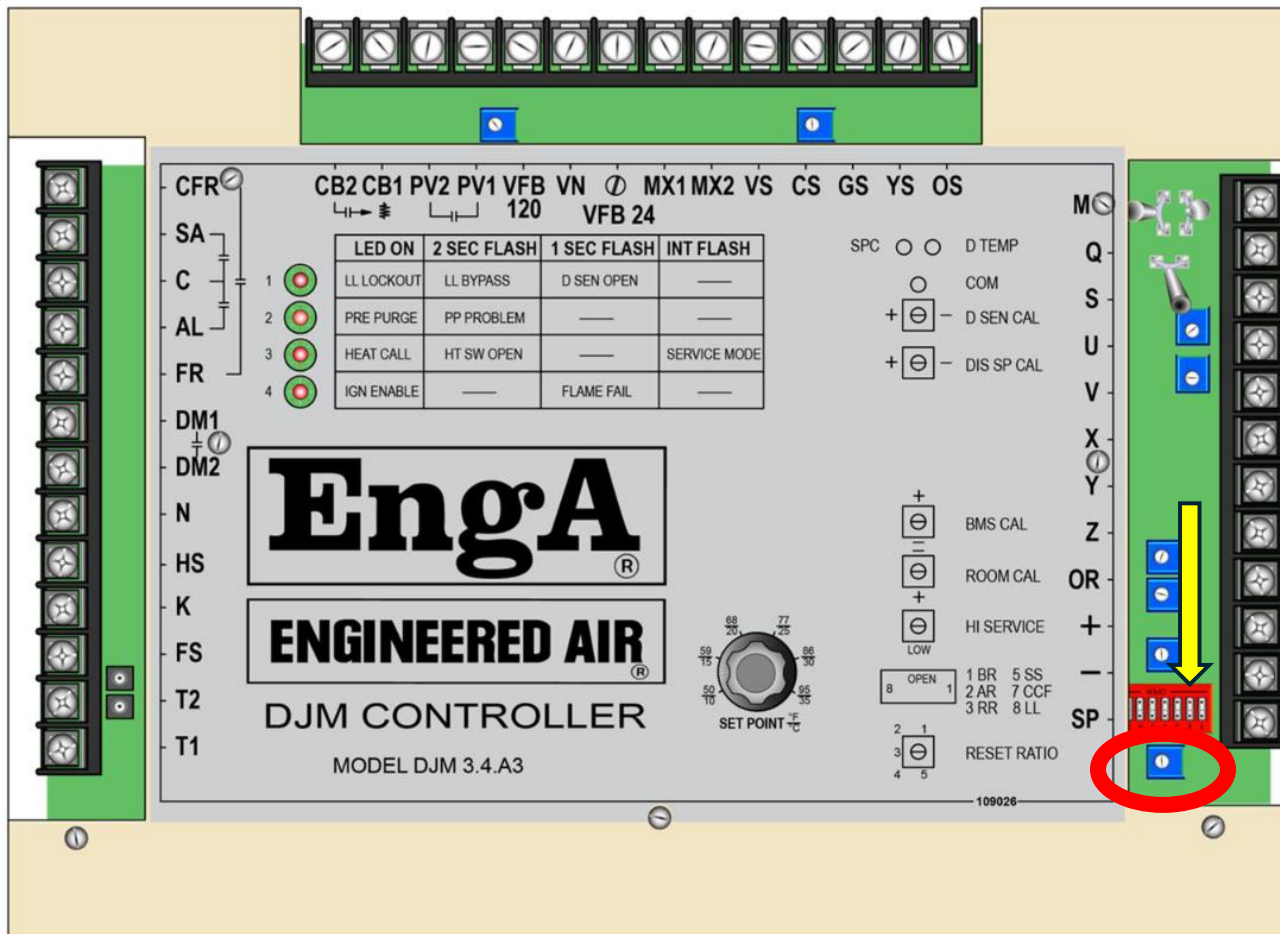
Unit on/off switch 'on', outside air damper opens. Blowers will delay on and run continuously. The DJM controller with an integral reference setpoint fixed at 75°F (23.9°C) will modulate the gas flow and combustion air to maintain the required discharge air temperature. Ambient temperature will proportionally reset the minimum discharge temperature from 75°F (23.9°C) @ 70°F (21.1°C) ambient, to a maximum of 86°F (30°C) @ 20°F (-6.7°C) ambient.



# Ambient reset unit wiring page.

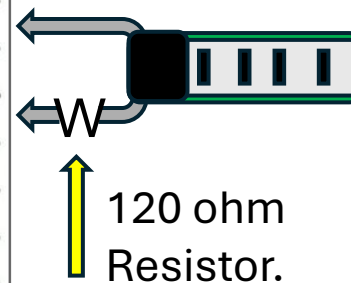


# Ambient reset.



## Ambient reset.

- Dip switch #2 on.
- Requires an ambient sensor to be wired to X and Z with a 120-ohm resistor.
- The D/A setpoint will be reset upwards based on the ambient temperature.
- Reset ratio pot setting sets the reset temperature range.



# Ambient reset.

| Reset Ratio Pot Setting | Reset Amount °F (no resistor) | Reset Amount °F (w/ 120Ω resistor) |
|-------------------------|-------------------------------|------------------------------------|
| 1                       | 10                            | 18                                 |
| 2                       | 11                            | 20                                 |
| 3                       | 13                            | 24                                 |
| 4                       | 16                            | 30                                 |
| 5                       | 21                            | 37                                 |

AMBIENT RESET SETPOINTS AND RANGES

| Pot #5 Setting | Reset Amount °F (No Resistor) | Reset Amount °C (No Resistor) | Reset Amount °F (120 ohm series Resistor) | Reset Amount °C (120 ohm series Resistor) |
|----------------|-------------------------------|-------------------------------|-------------------------------------------|-------------------------------------------|
| 1              | 10                            | 5.6                           | 18                                        | 10.0                                      |
| 2              | 11                            | 6.1                           | 20                                        | 11.1                                      |

HOTTER

STANDARD

DIAL SETPOINT

120 OHM RESISTOR

COLDER

-20F 0F 20F 40F 60F 80F  
AMBIENT TEMPERATURE

|   |    |      |    |      |
|---|----|------|----|------|
| 3 | 13 | 7.2  | 24 | 13.3 |
| 4 | 16 | 8.9  | 30 | 16.7 |
| 5 | 21 | 11.7 | 37 | 20.6 |

CALCULATED SETPOINT BASED ON AMBIENT RESET



# Dip switch #3 Room reset.

## ROOM RESET

(dip switch #3)

1=21°F (11.7 °C) 2=27(15) 3=32(17.8) 4=44(24.4) 5=59(32.8)

*(values are for 80°F setpoint- see R&D manual for additional values)*

### NOTE:

- The reset is bi-directional.
- The numbers given are for total degrees of reset.

DISABLED OFF ☐

ENABLED ON ☐

Reset Ratio Pot #5

Specify Amount (°F)



# Room reset unit function page.

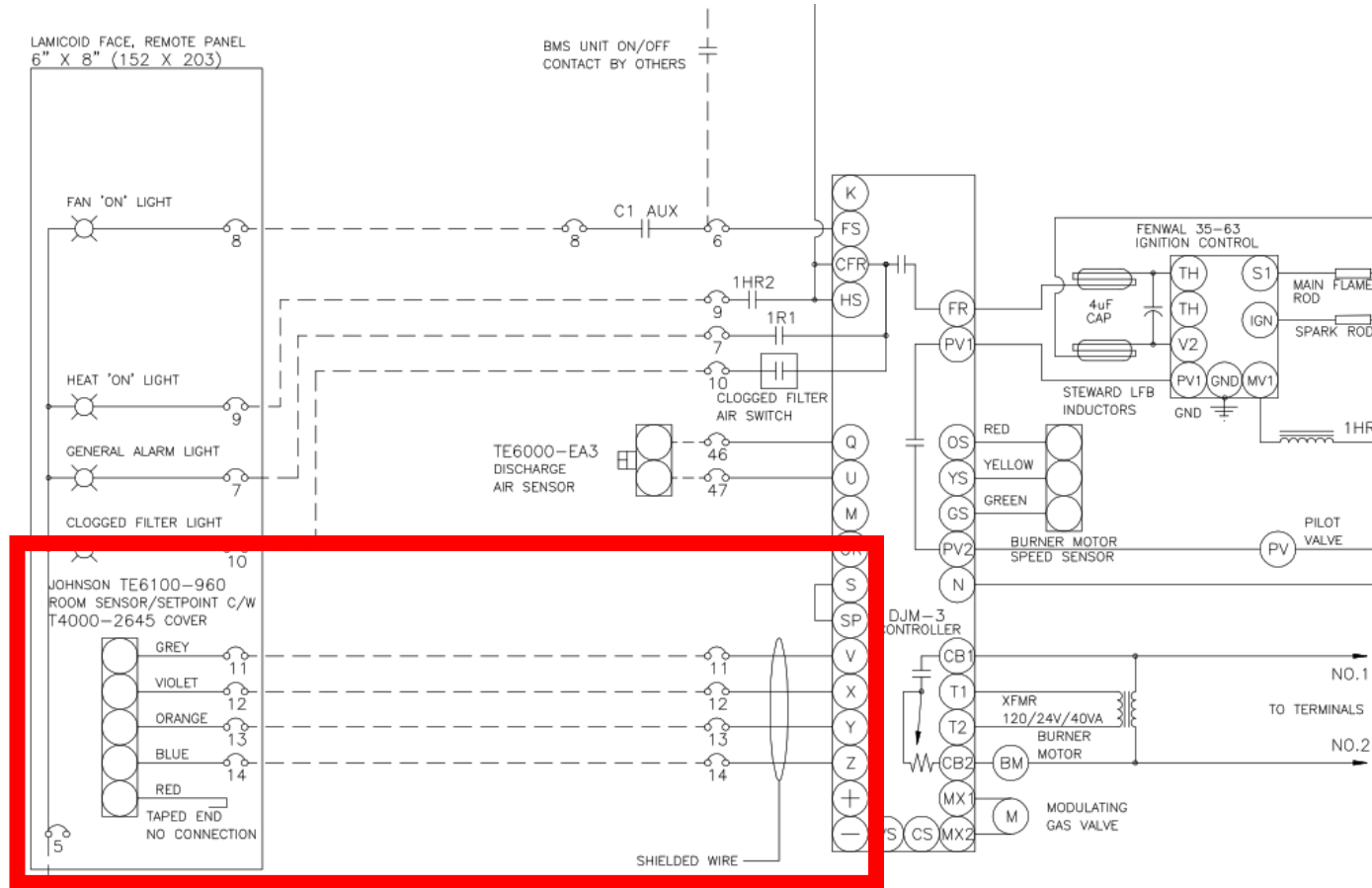
## UNIT FUNCTION

Disconnect switch 'on', service switch 'on', fire alarm contacts(by others) 'closed' (jumper if not required).

Unit on/off switch 'on', outside air damper opens. Blowers will delay on and run continuously. The DJM controller with an integral reference setpoint fixed at 75°F (23.9°C) will modulate the gas flow and combustion air to maintain the required discharge air temperature. Room sensor/setpoint will reset the discharge air temperature between 60.5°F (15.8°C) to 93°F (33.9°C) to satisfy room setpoint requirements.



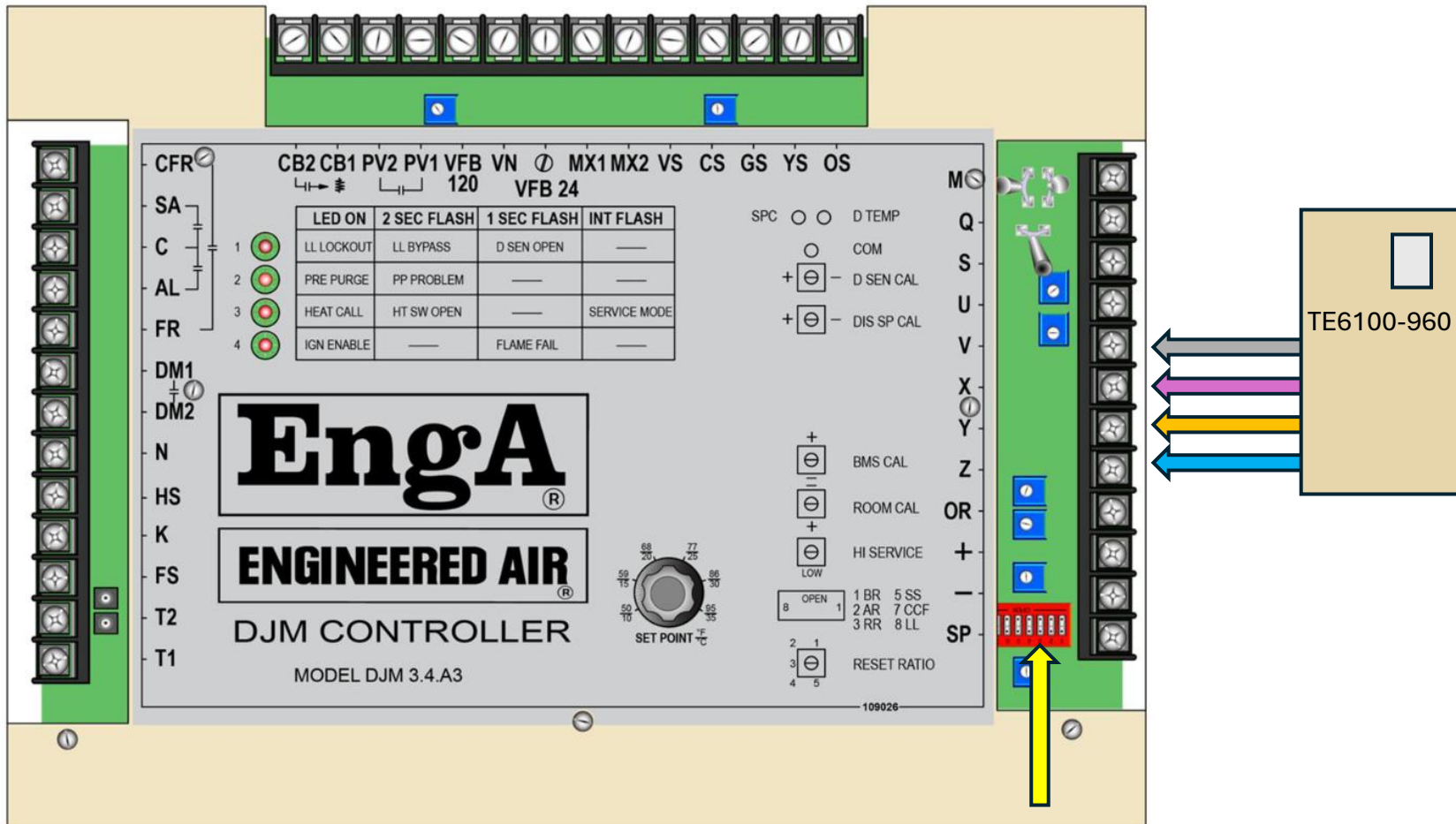
# Room reset unit wiring page.



# Room reset.

## Room reset.

- Dip switch #3 on.
- ROOM CAL & RESET RATIO pots are used.
- Reset band is +/-3°F
- Actual degrees of reset depends on reset ratio pot settings and D/A setpoint.
- The calculated discharge air setpoint (dial setting + reset) is limited to between 48 and 120°F.

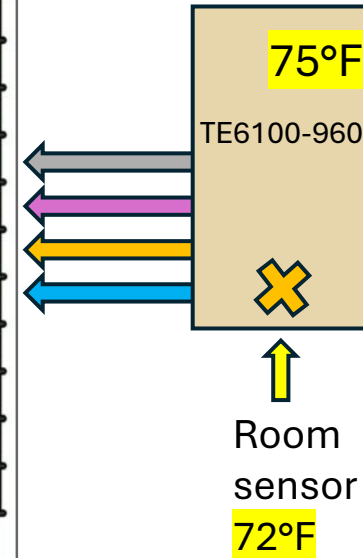
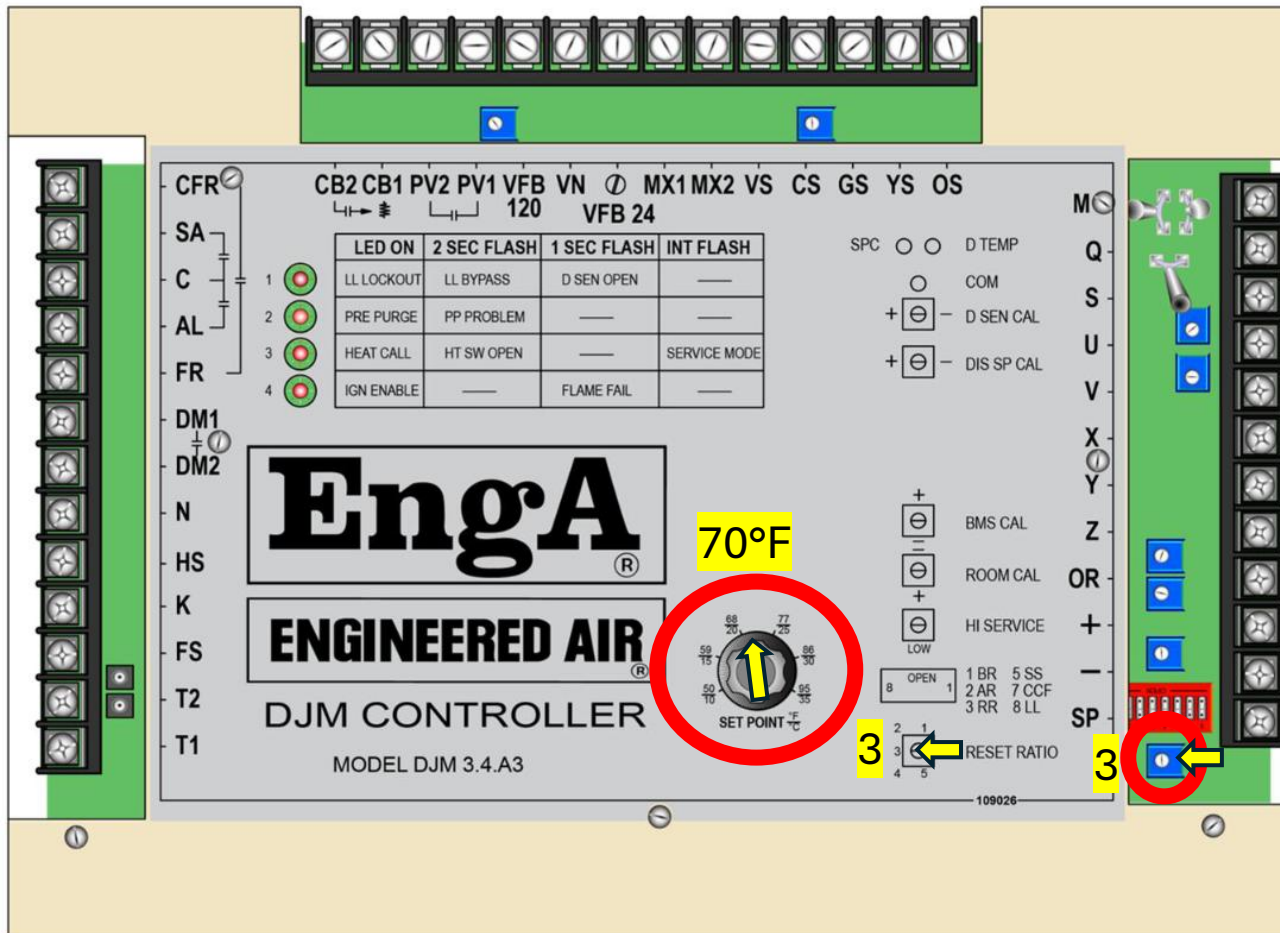


# Room reset authority table.

| Discharge Set-Point | Reset Ratio Pot | Maximum Temp. °C | Minimum Temp. °C | Reset Band Width °C | Maximum Temp. °F | Minimum Temp. °F | Reset Band Width °F |
|---------------------|-----------------|------------------|------------------|---------------------|------------------|------------------|---------------------|
| 15.5°C<br>60°F      | 1               | 25 (+9.5)        | 12 (-3.5)        | 13                  | 77 (+17)         | 54 (-6)          | 23                  |
|                     | 2               | 26 (+10.5)       | 11.5 (-4)        | 14.5                | 79 (+19)         | 53 (-7)          | 26                  |
|                     | 3               | 28 (+12.5)       | 10.5 (-5)        | 17.5                | 82 (+22)         | 51 (-9)          | 31                  |
|                     | 4               | 33 (+17.5)       | 9 (-6.5)         | 24                  | 91 (+31)         | 48 (-12)         | 43                  |
|                     | 5               | 38 (+22.5)       | 8 (-6.5)         | 30                  | 100 (+40)        | 48 (-12)         | 52                  |
| 21°C<br>70°F        | 1               | 29 (+8)          | 16 (-5)          | 13                  | 84 (+14)         | 61 (-9)          | 23                  |
|                     | 2               | 30 (+9)          | 15 (-6)          | 15                  | 86 (+16)         | 59 (-11)         | 27                  |
|                     | 3               | 32 (+11)         | 14 (-7)          | 18                  | 90 (+20)         | 57 (-13)         | 33                  |
|                     | 4               | 37 (+16)         | 11 (-10)         | 26                  | 99 (+29)         | 52 (-18)         | 47                  |
|                     | 5               | 40.5 (+19)       | 9 (-12)          | 31.5                | 105 (+35)        | 48 (-22)         | 57                  |
| 27°C<br>80°F        | 1               | 33 (+7)          | 21 (-6)          | 12                  | 91 (+11)         | 70 (-10)         | 21                  |
|                     | 2               | 34 (+7)          | 19 (-8)          | 15                  | 93 (+13)         | 66 (-14)         | 27                  |
|                     | 3               | 35.5 (+8)        | 18 (-9)          | 17.5                | 96 (+16)         | 64 (-16)         | 32                  |
|                     | 4               | 39 (+12)         | 15 (-12)         | 24                  | 103 (+23)        | 59 (-21)         | 44                  |
|                     | 5               | 44 (+17)         | 11 (-16)         | 33                  | 111 (+31)        | 52 (-28)         | 59                  |



# Room reset.



## Example:

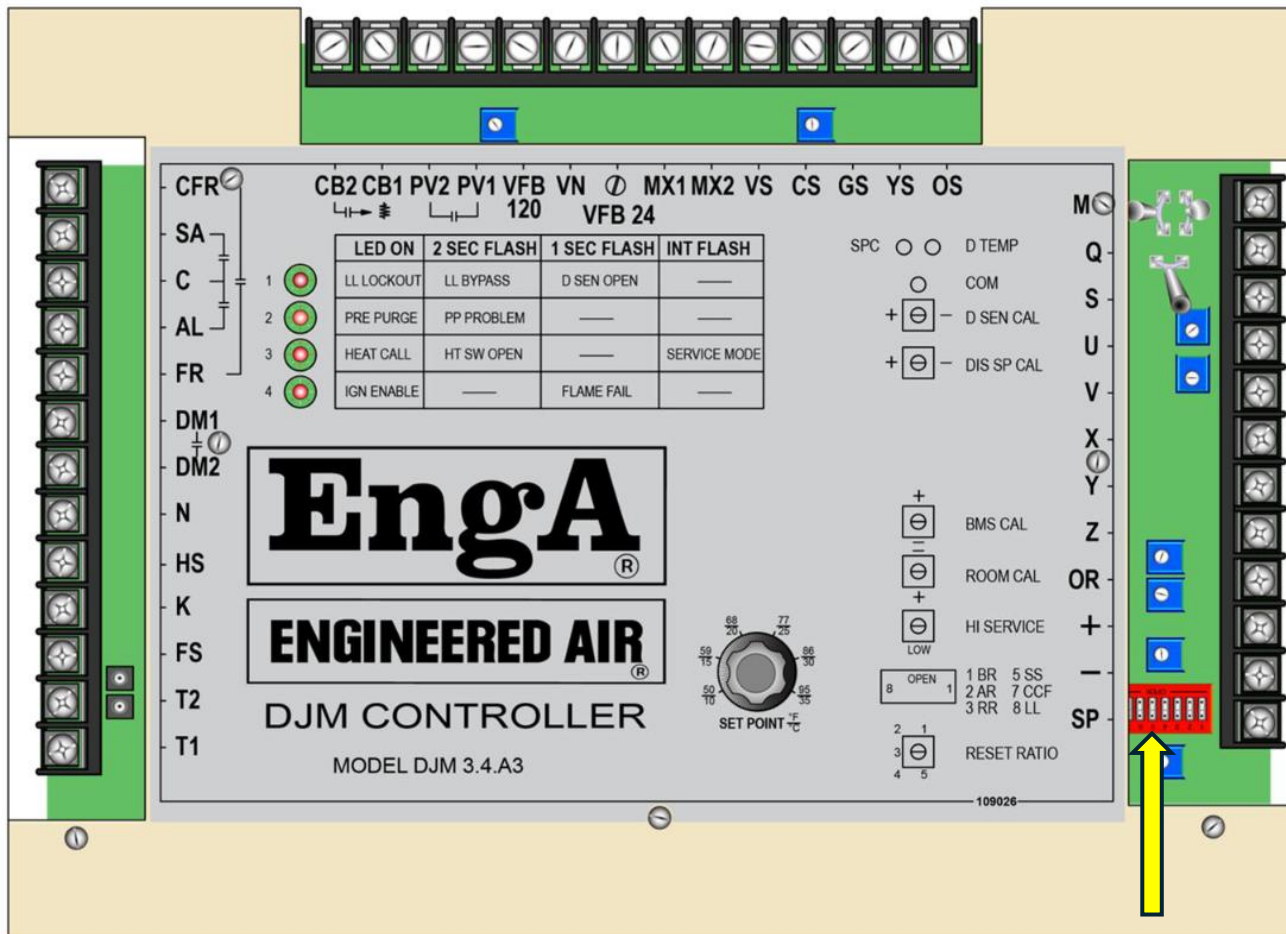
- DJM3 setpoint 70°F.
- Reset ratio pot set at 3.
- Room thermostat set at 75°F.
- Room sensor is sensing 72°F.
- Discharge setpoint is reset up the full amount(+20) to 90°F.
- Unit will discharge 90°F until the room stat is satisfied. The setpoint will then decrease back to 70°F.
- Room sensor is sensing 78°F.
- Discharge setpoint is reset down the full amount(-13) to 57°F.
- Unit will discharge 57°F until the room stat is satisfied. The setpoint will then increase back to 70°F.



# Dip switch #5 Service mode.

## Service mode.

- Dip switch #5 on.
- The HI SERVICE pot is to be adjusted by a qualified service technician only.
- This pot should only be adjusted when using a combustion analyzer.
- Allows direct control of the burner firing rate.
- Used in conjunction with 'Low fire' and 'Curve matching' pots for combustion setup.
- Turn off dip switch #5 when done.



# Dip switch #7 Constant combustion fan.

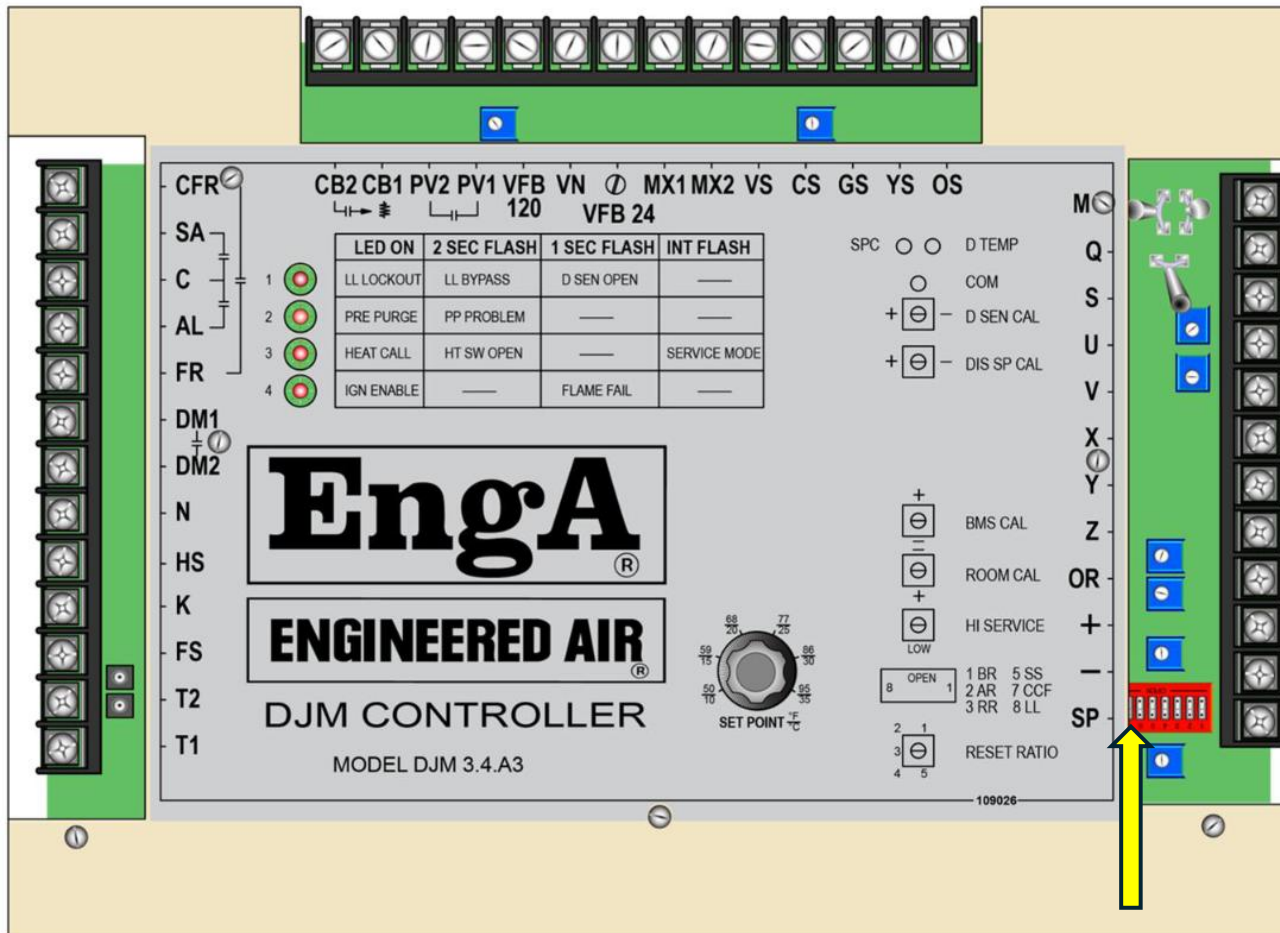
|                                |                                                                                            |                       |                                                             |
|--------------------------------|--------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------|
| APPLICATION<br>(dip switch #7) | STANDARD <i>(4 minutes maintain purge)</i><br>DOOR HEATER <i>(constant maintain purge)</i> | STANDARD<br>DOOR HEAT | OFF <input type="checkbox"/><br>ON <input type="checkbox"/> |
|--------------------------------|--------------------------------------------------------------------------------------------|-----------------------|-------------------------------------------------------------|



# Dip switch #7 Constant combustion fan.

Constant combustion fan.

- Dip switch #7 on.
- Door heater application.
- Maintains combustion fan in constant purge mode if “ON”.
- Allows burner to light without going through pre-purge timing.



# Dip switch #8 Low limit.

AUTO BYPASS LOWLIMIT  
(dip switch #8)

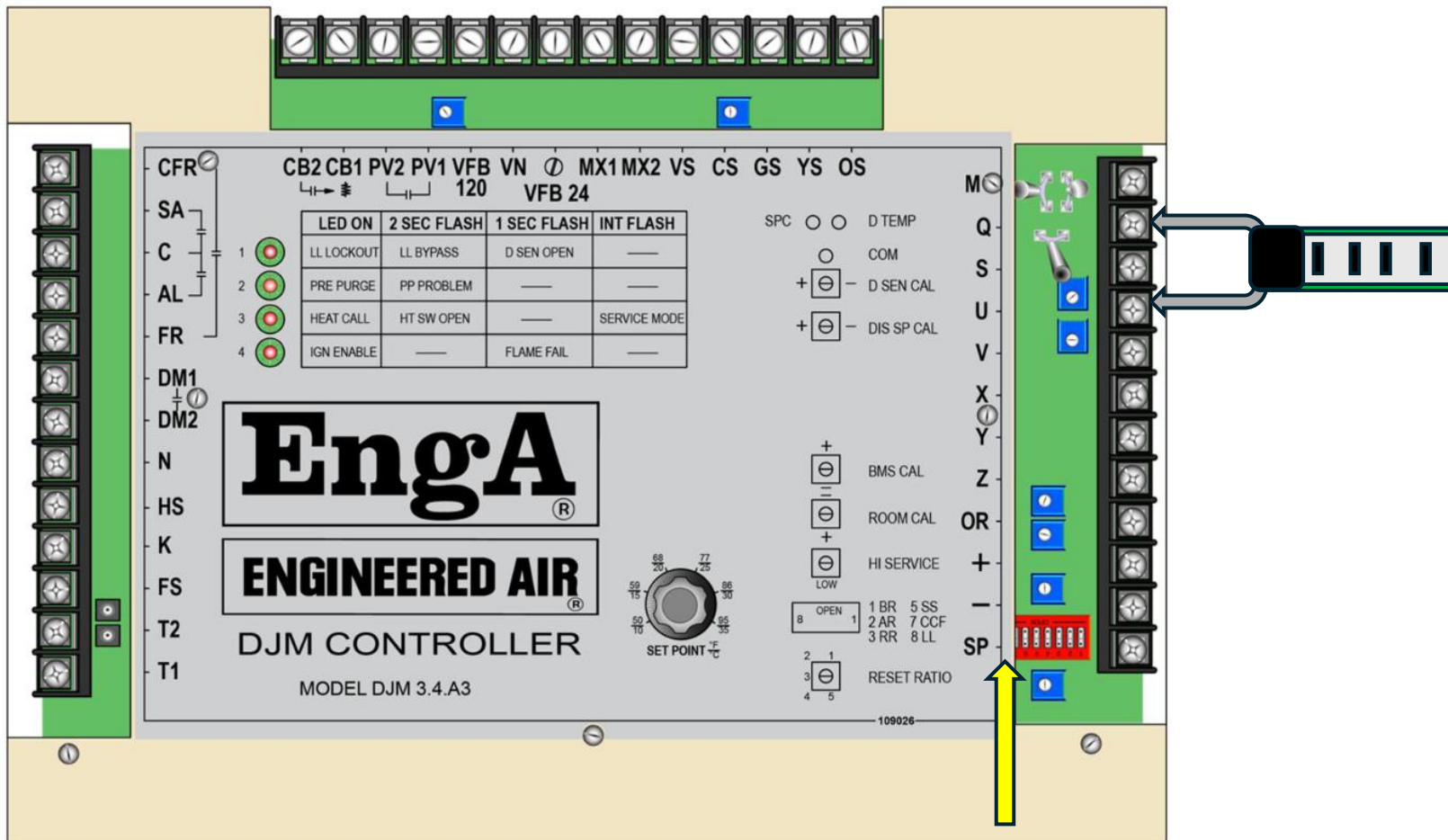
|          |     |                          |
|----------|-----|--------------------------|
| DISABLED | OFF | <input type="checkbox"/> |
| ENABLED  | ON  | <input type="checkbox"/> |



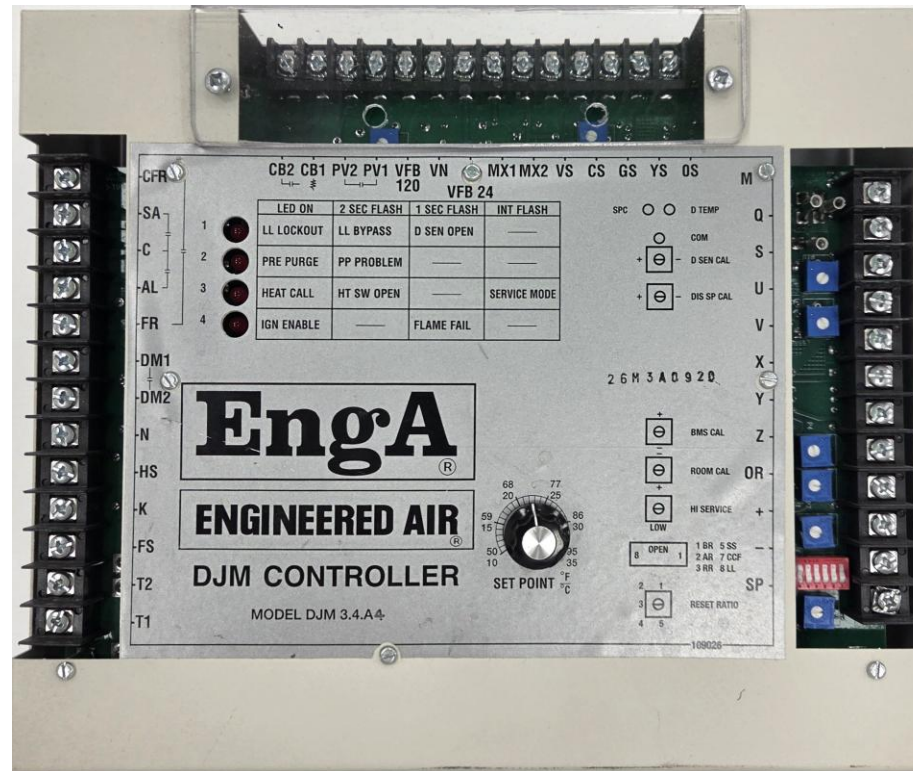
# Dip switch #8 Low limit.

Low limit.

- Dip switch #8 on.
- Low limit setting is 40°F(4.4°C)
- Not adjustable.
- 5-minute bypass timer and 30 second anti-noise timer.
- Timer starts every time terminals K,SA and FS are energized.
- Terminal AL activate when 'low limit' alarm occurs.
- Reset alarm by cycling power to terminal T1 and T2.



# Air side operation.



# Blower strategies setup page.

## BLOWER / DAMPER OPERATION

- The combination of energized night (K) and fan (FS) terminals set the blower and damper operation at night.

### DAY (*FS on, HS on*)

- Continuous Blower, Dampers Open, Disch. Control

☐

### NIGHT (*FS off, HS on, K on*)

- Intermittent Blower, Dampers Closed, Room Control

☐

### ALTERNATE NIGHT OPERATION (*FS, K terminals all energized, HS on or off*)

- Continuous Blower, Dampers Closed, Discharge Control w/ Room Reset

☐

# Blower strategies day and night operation.

| Terminal Status |     |     | Blower<br>Operation | Damper<br>Operation | Control Source            | Control<br>Mode |
|-----------------|-----|-----|---------------------|---------------------|---------------------------|-----------------|
| HS              | FS  | K   |                     |                     |                           |                 |
| XXX             | Off | Off | Off                 | Off                 | N/A                       | Off             |
| XXX             | On  | Off | Constant            | Powered             | Discharge/Room/BMS        | Day             |
| Off             | XXX | On  | Off                 | Off                 | N/A                       | Off             |
| On              | Off | On  | Intermittent        | Off                 | Room                      | Night           |
| On              | On  | On  | Constant            | Off                 | Discharge w/Room<br>Reset | Night           |

XXX = Switch (SW.) can be "ON" or "OFF"



# Blower operation day mode.

## Day mode

If the discharge sensor is warm, the supply air fan will start in 30 seconds.

If the heat switch is on and there is an immediate heat call or a heat call within the first minute of the blower starting, the blower will shut off or remain off until the burner has been running for 30 seconds.

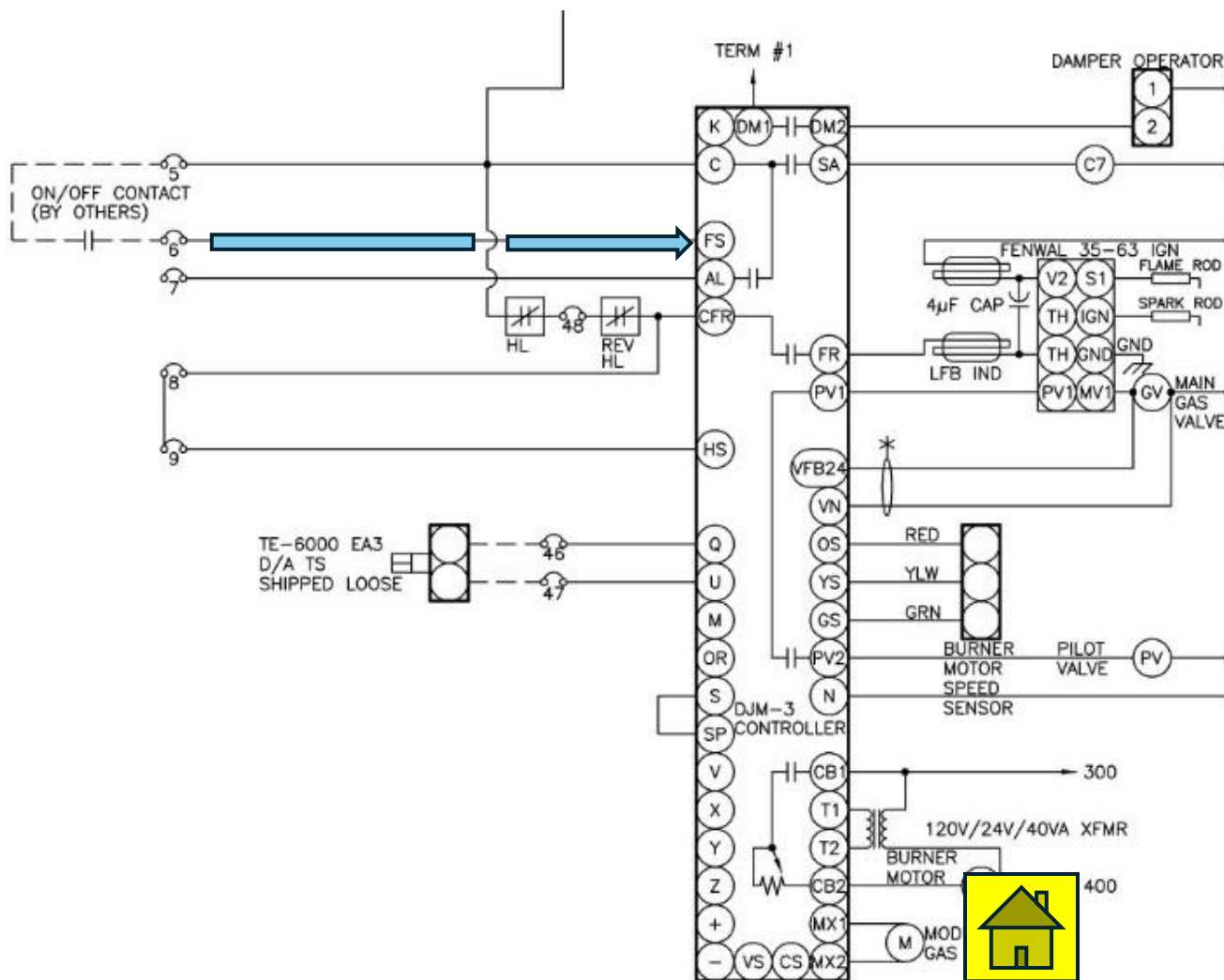
If during this time the heat call is lost, the blower will cycle back on but the pre-purge will continue *(Under some conditions, the supply fan may cycle a few times before the heat starts)*.

If there is a heat call and the heat switch is off, and the discharge temperature is not below 40°F, the DJM3 will ignore the requirements for having the burner on before the supply blower is started.

If the discharge temperature is below 40°F and the heat switch is off, the DJM3.2 will not start the blower until the discharge sensor rises above 40°F and the low limit is set in the activated position *(dipswitch 8 "on")*. Note that this assumes the low limit bypass is still timing. If the low limit bypass has timed out the DJM3.2 will lock off on low limit.



# Blower operation day mode.

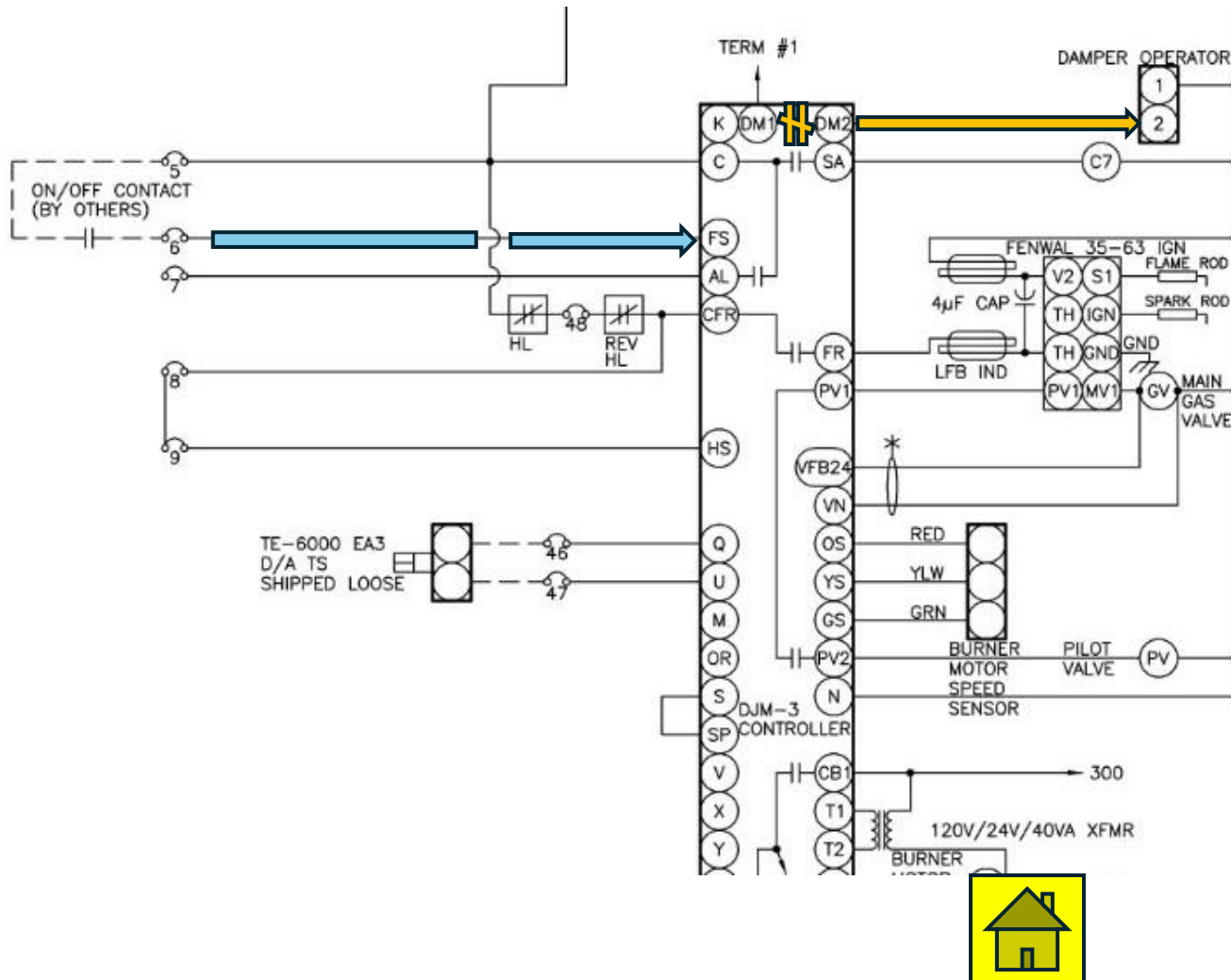


Day mode (No heat call).

Ventilation mode.

1. Terminal FS powered by 24vac input.

# Blower operation day mode.

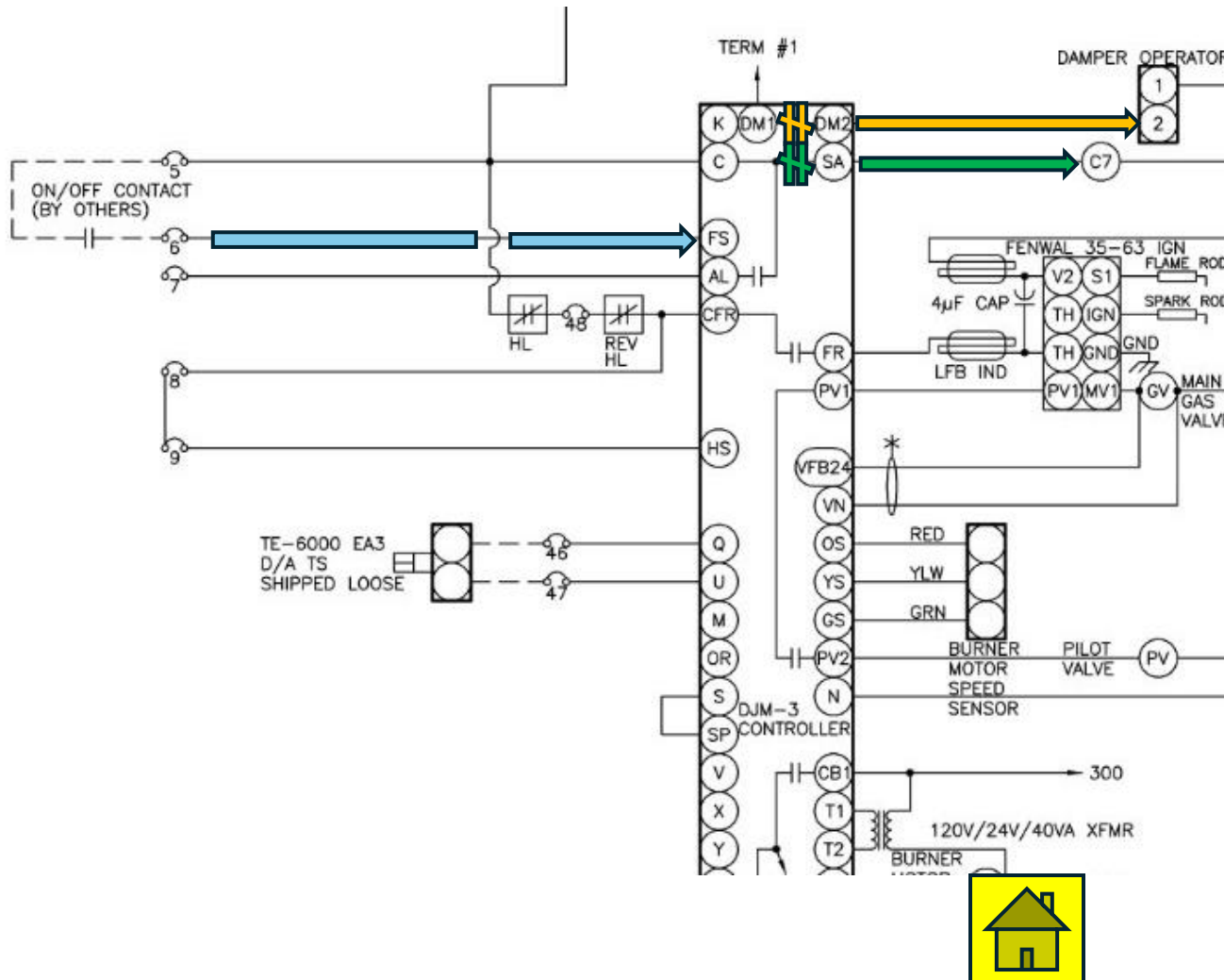


Day mode (No heat call).

Ventilation mode.

1. Terminal FS powered by 24vac input.
2. DM1 and DM2 contacts closed.
3. DM2 powers damper motor, dampers start to open.

# Blower operation day mode.

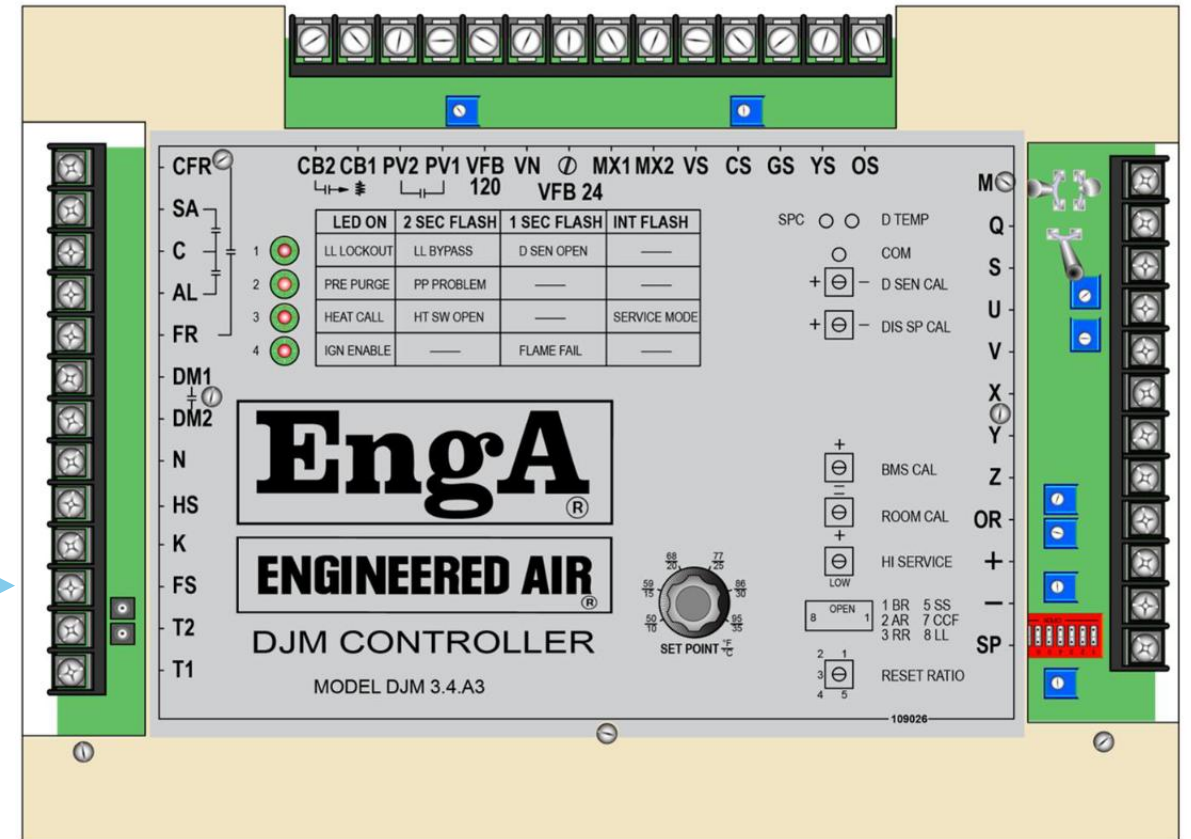
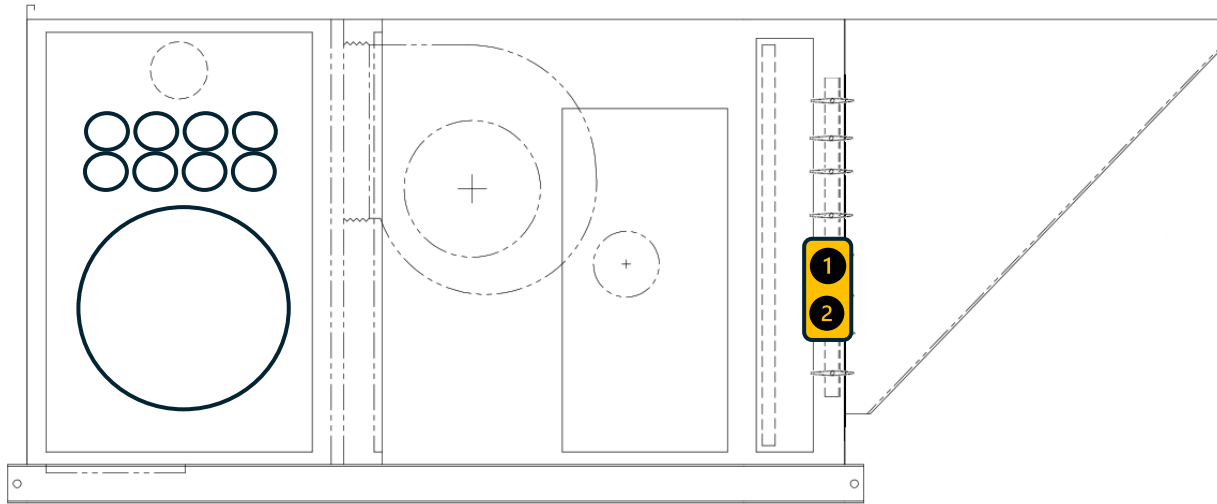


Day mode (No heat call).

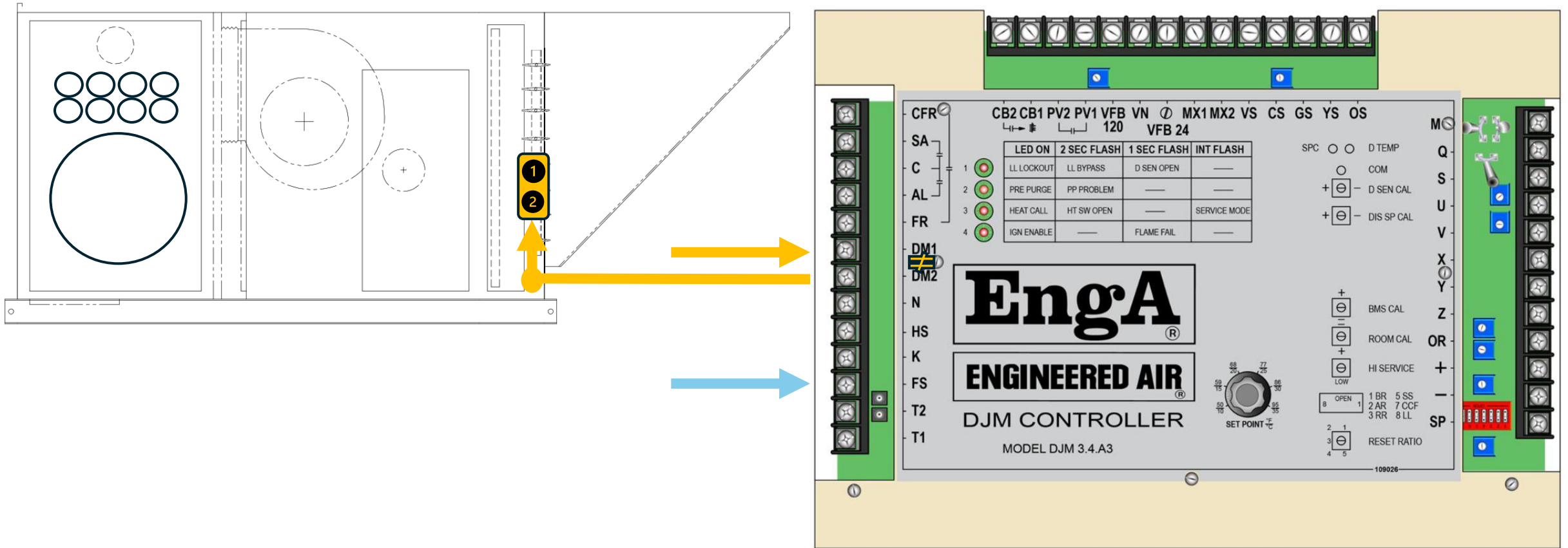
Ventilation mode.

1. Terminal FS powered by 24vac input.
2. DM1 and DM2 contacts closed.
3. DM2 powers damper motor, dampers start to open.
4. Blower start delay = 30 seconds.
5. After 30 second delay expires, contacts between terminals C and SA close, terminal SA powers C7 contactor and the supply fan motor starts.

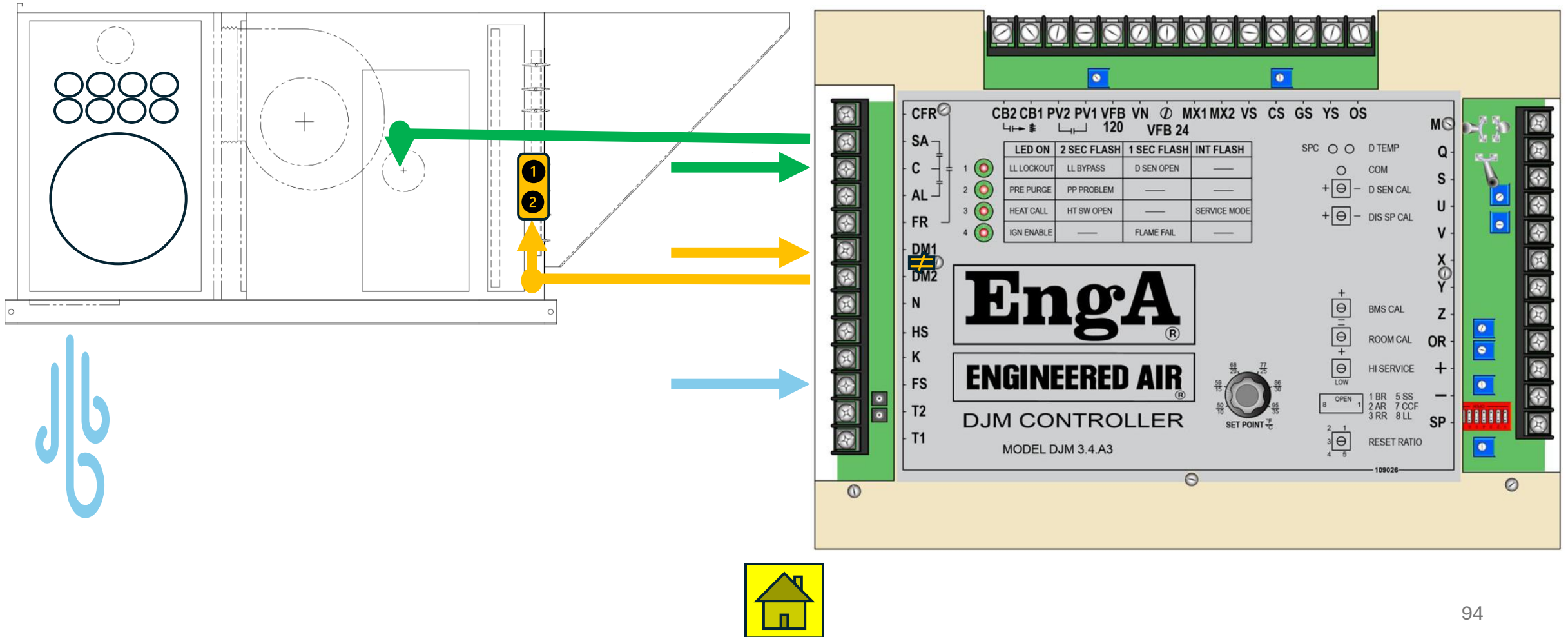
# Blower operation day mode.



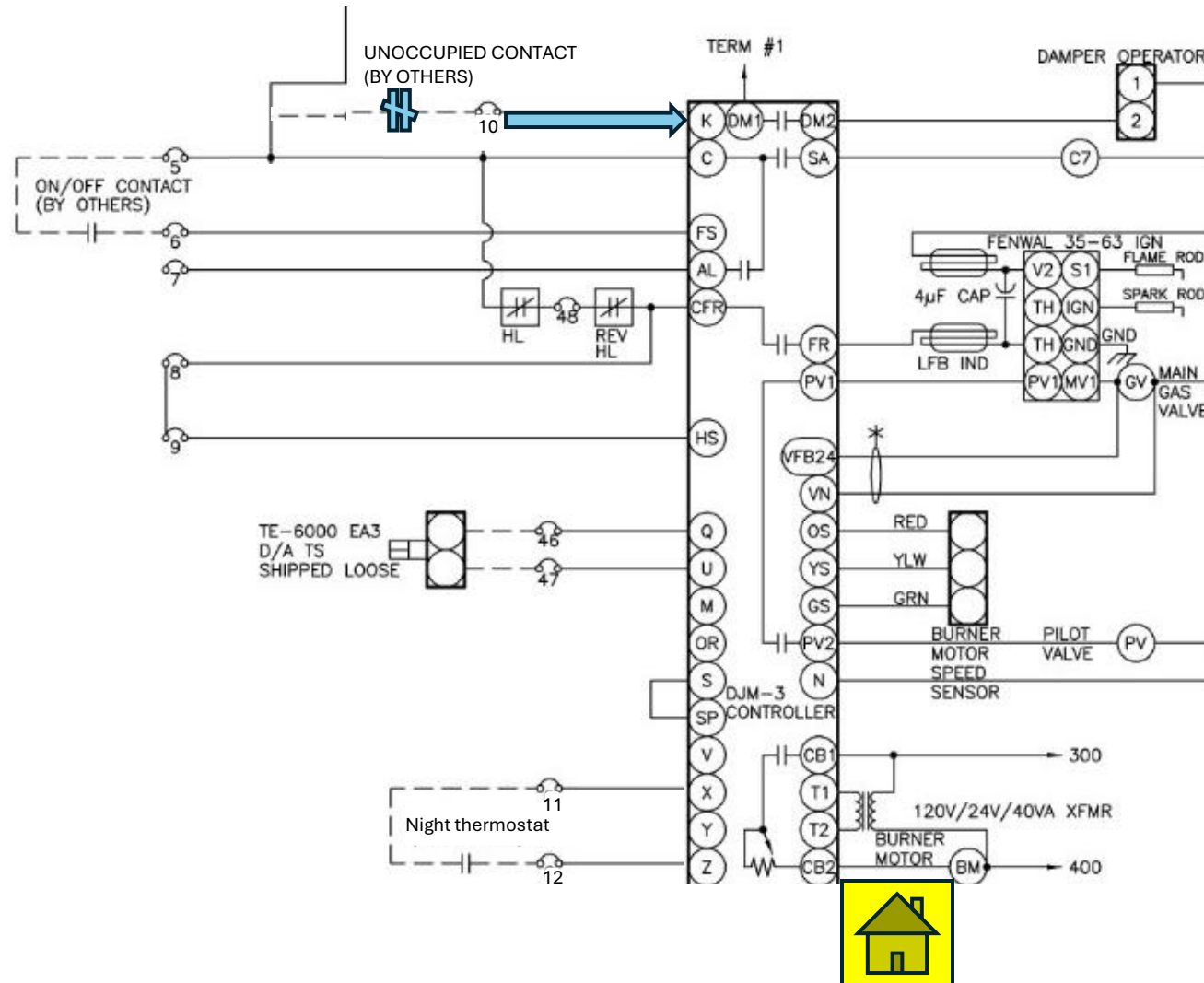
# Blower operation day mode.



# Blower operation day mode.



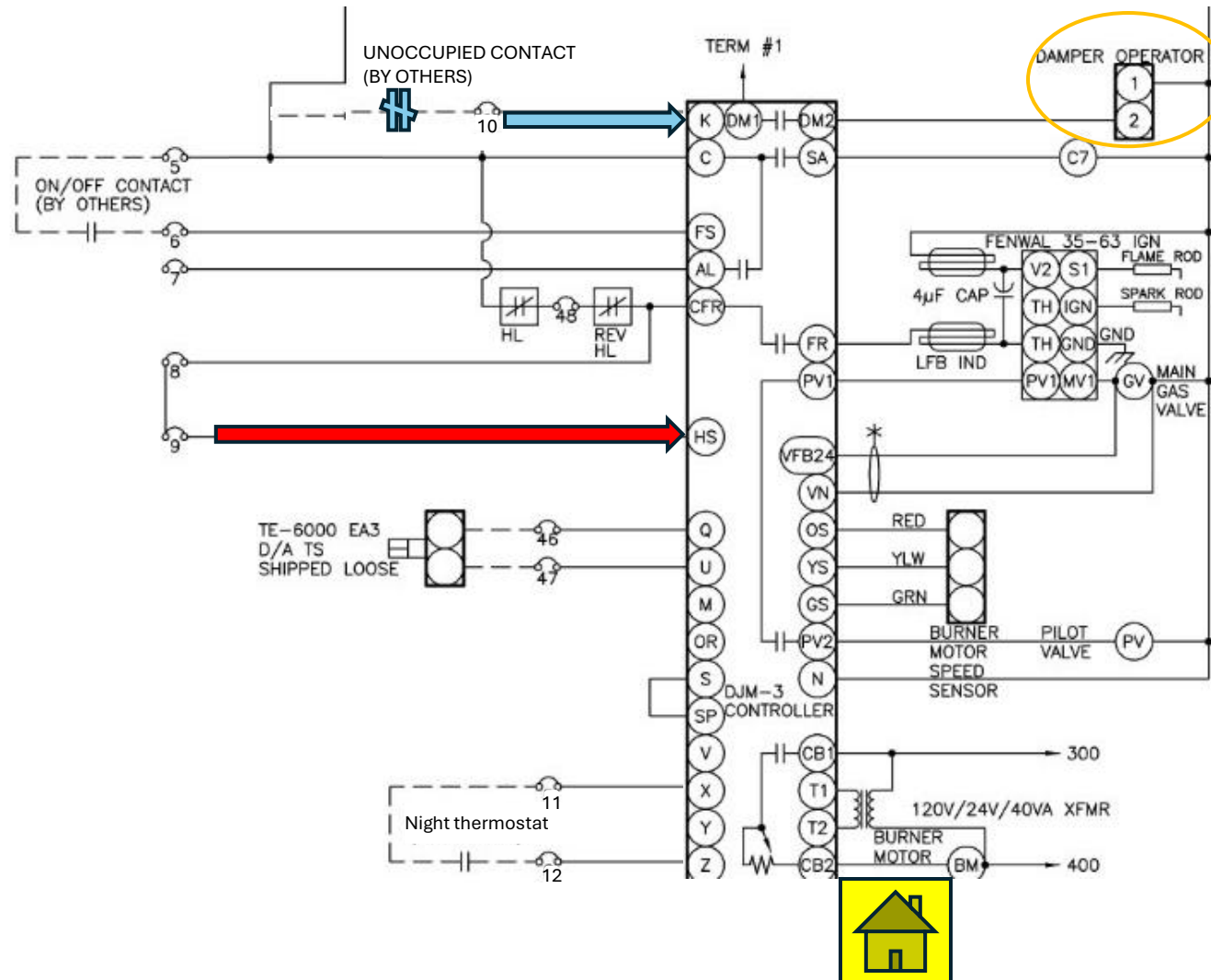
# Blower operation night mode.(Make/Break stat)



Night mode.

1. Terminal K powered by unoccupied contact, 24vac input.

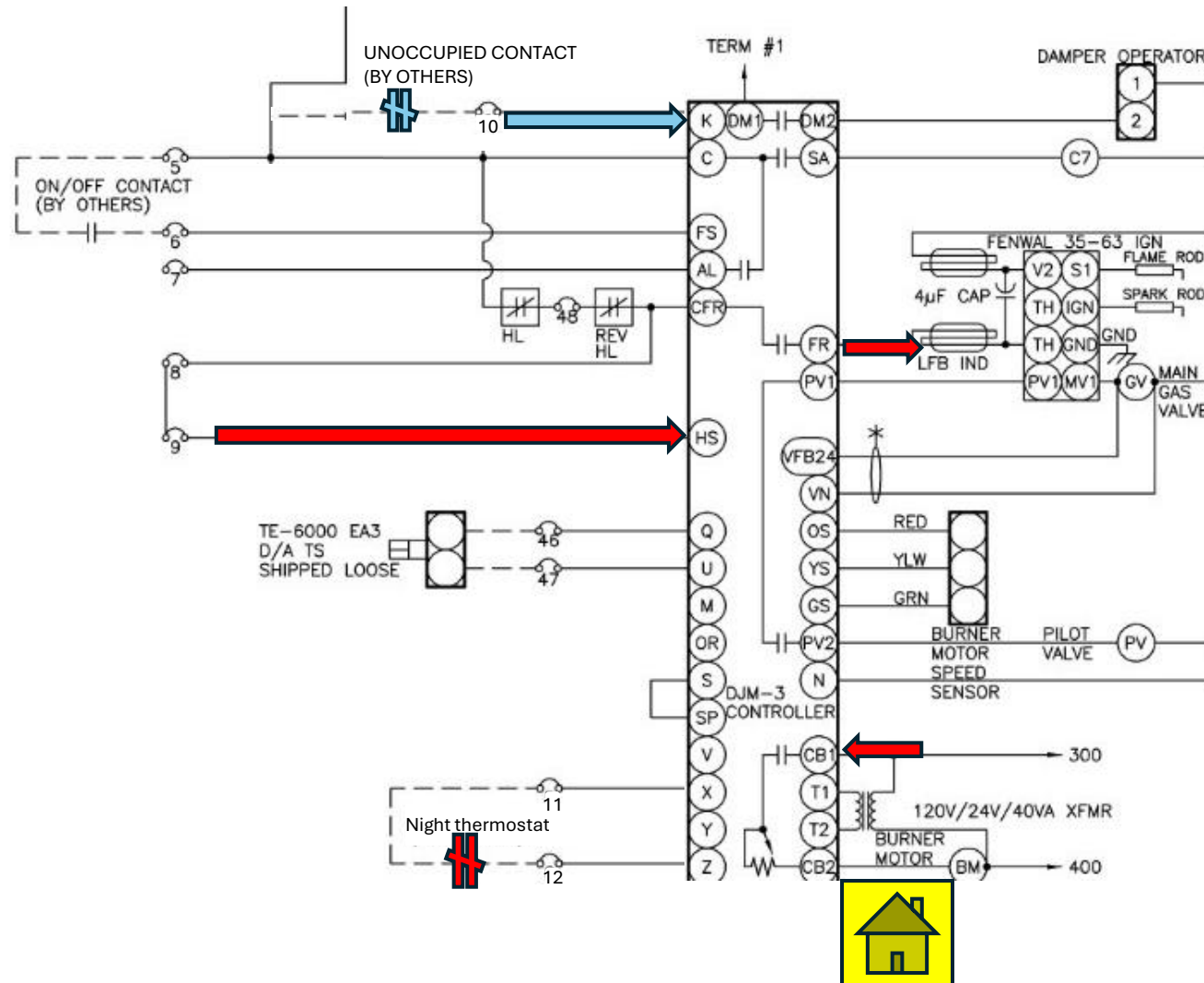
# Blower operation night mode.(Make/Break stat)



Night mode.

1. Terminal K powered by unoccupied contact, 24vac input.
2. Terminal HS powered by 24vac input.
3. Dampers remain closed.

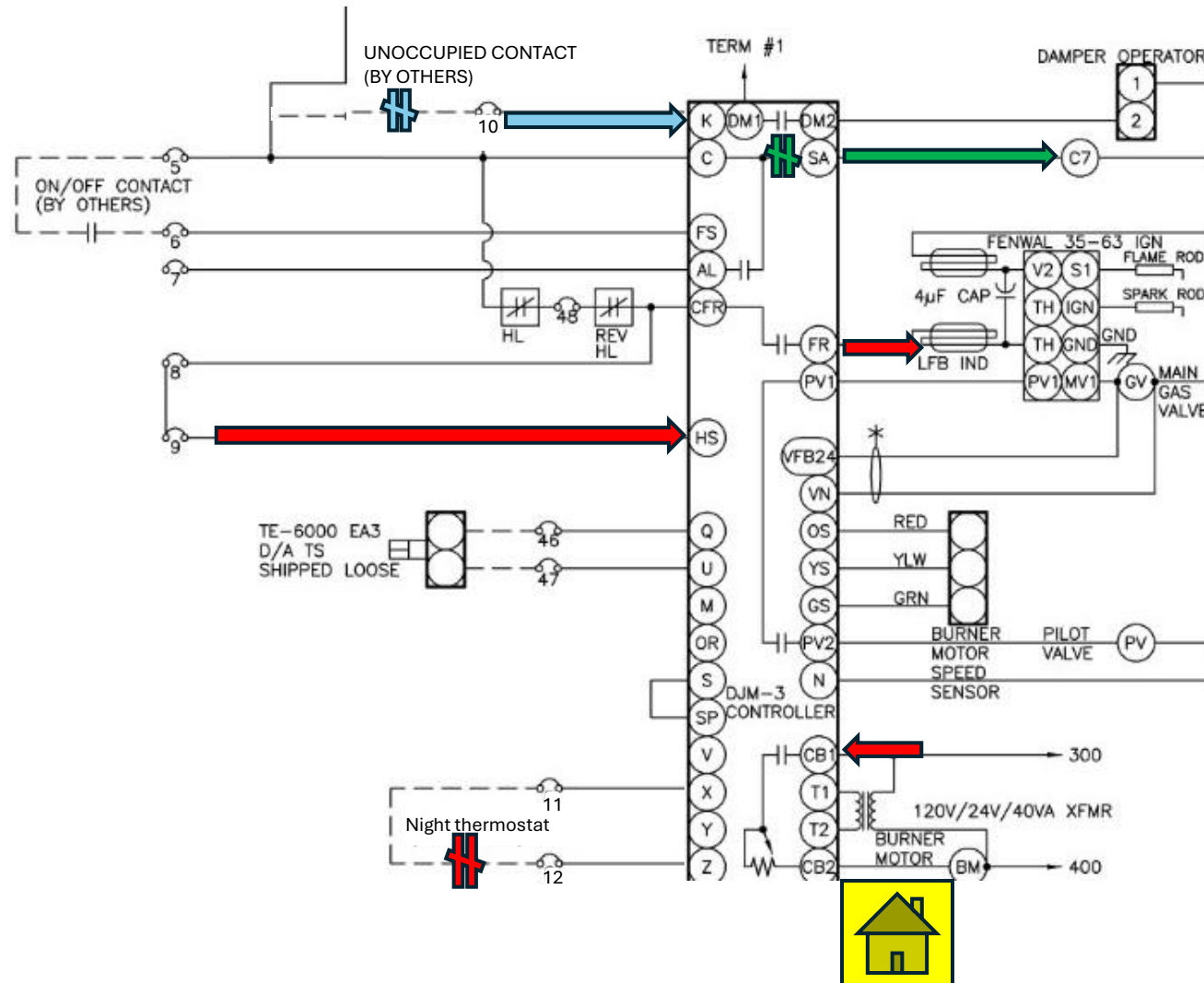
# Blower operation night mode.(Make/Break stat)



Night mode.

1. Terminal K powered by unoccupied contact, 24vac input.
2. Terminal HS powered by 24vac input.
3. Dampers remain closed.
4. Night thermostat calls for heat, discharge air setpoint is now 120°F.
5. Burner sequence starts.

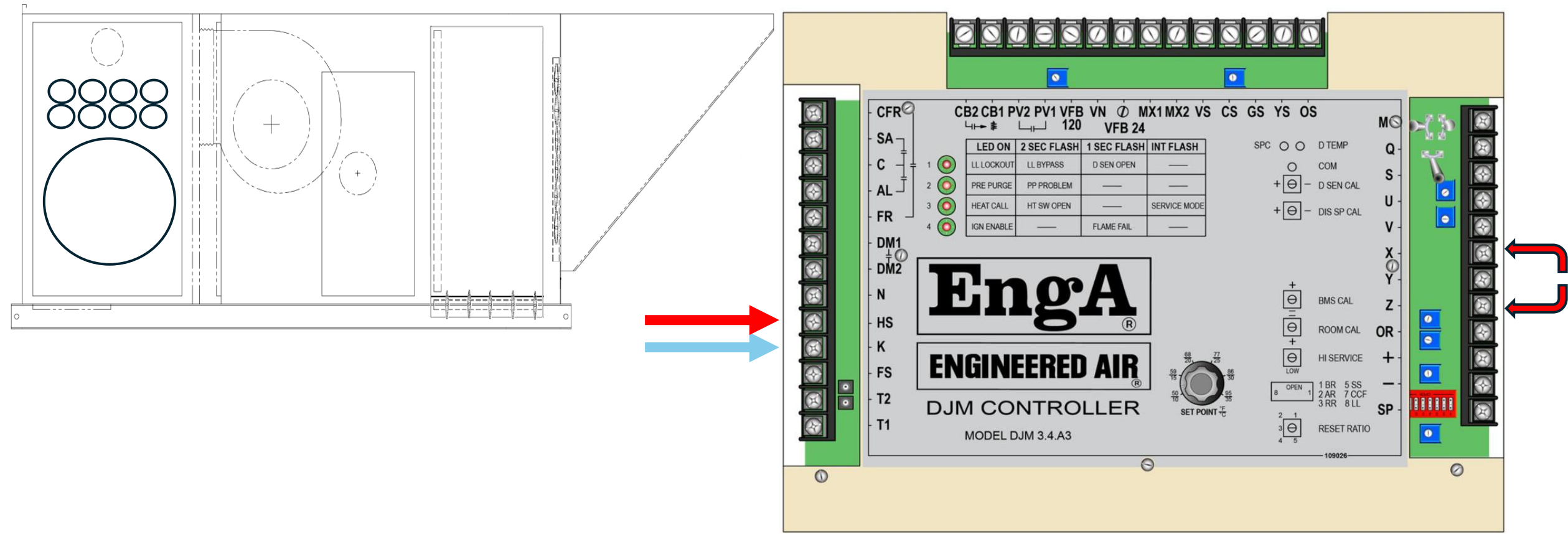
# Blower operation night mode.(Make/Break stat)



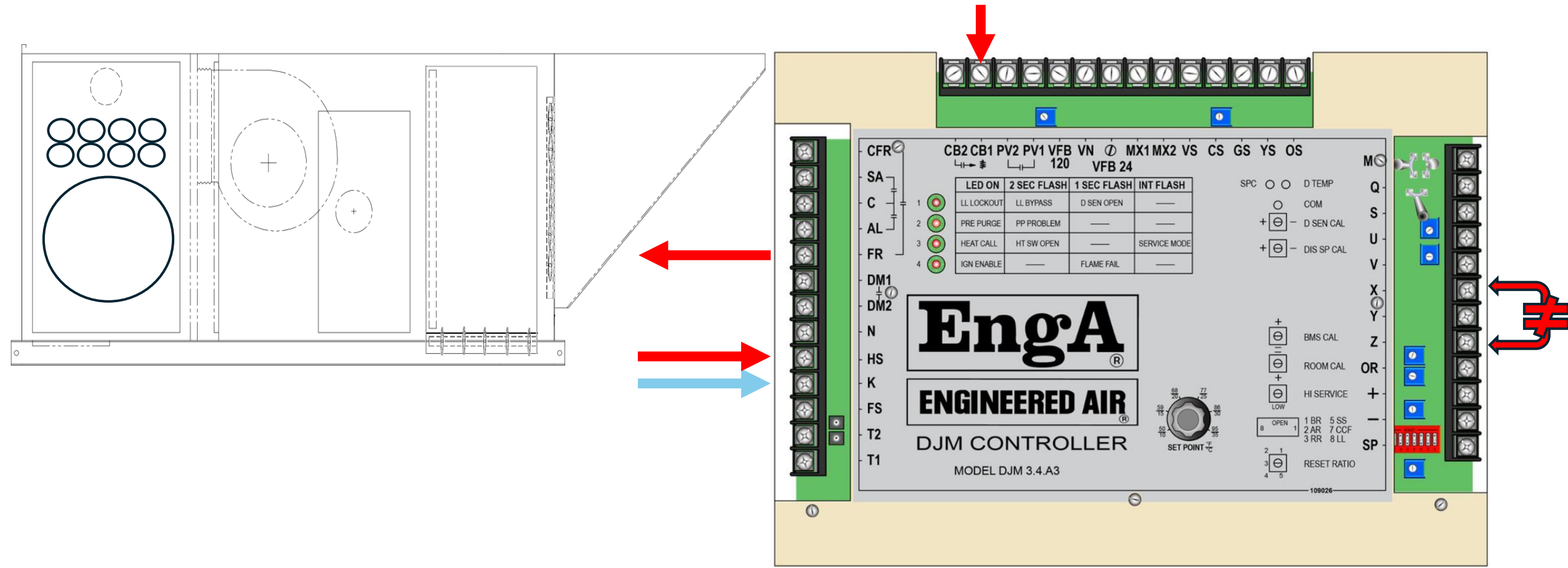
## Night mode.

1. Terminal K powered by unoccupied contact, 24vac input.
2. Terminal HS powered by 24vac input.
3. Dampers remain closed.
4. Night thermostat calls for heat, discharge air setpoint is now 120°F.
5. Burner sequence starts.
6. After 30 second delay expires, contacts between terminals C and SA close, terminal SA powers C7 contactor and the supply fan motor starts.

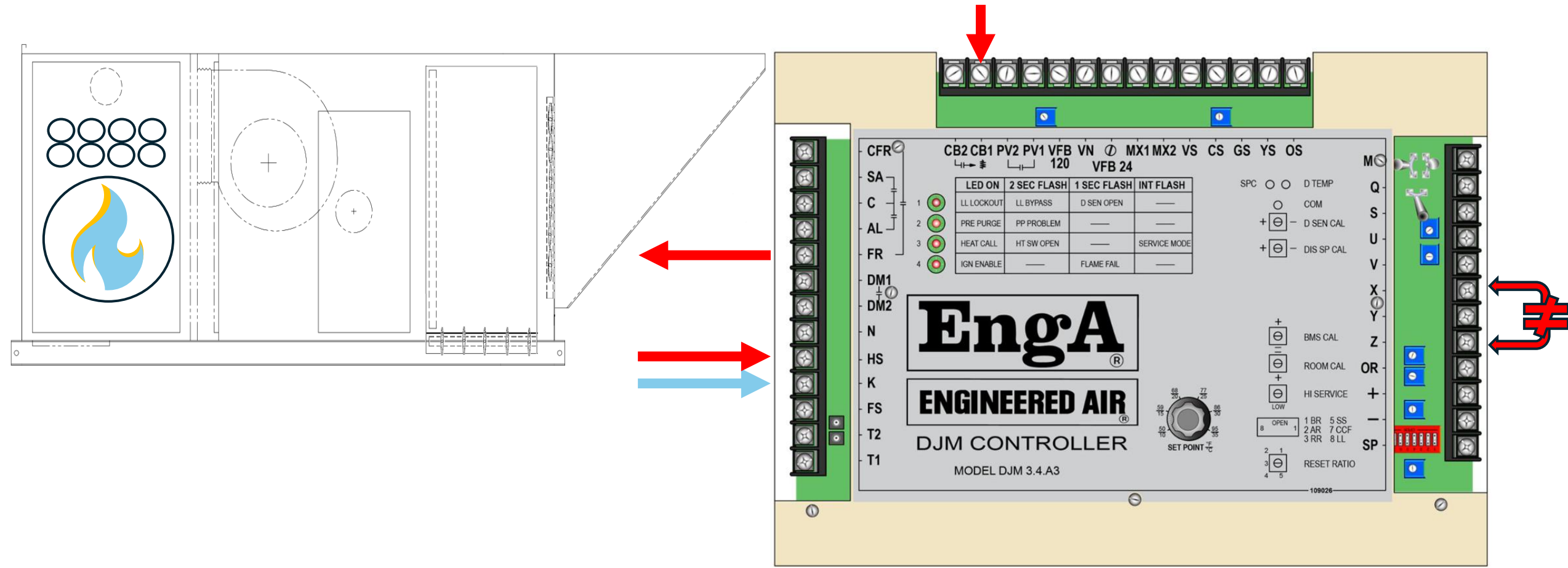
# Blower strategies night mode.(Make/Break stat)



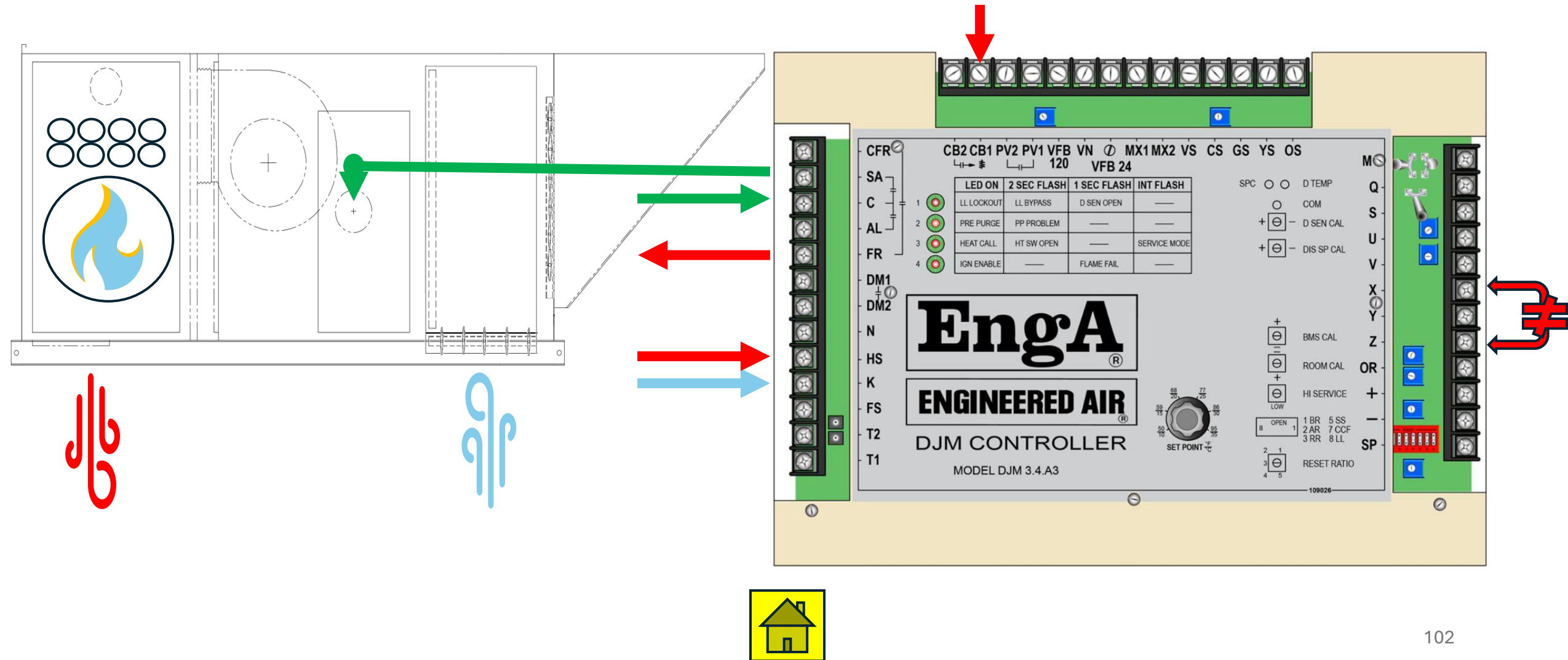
# Blower strategies night mode.(Make/Break stat)



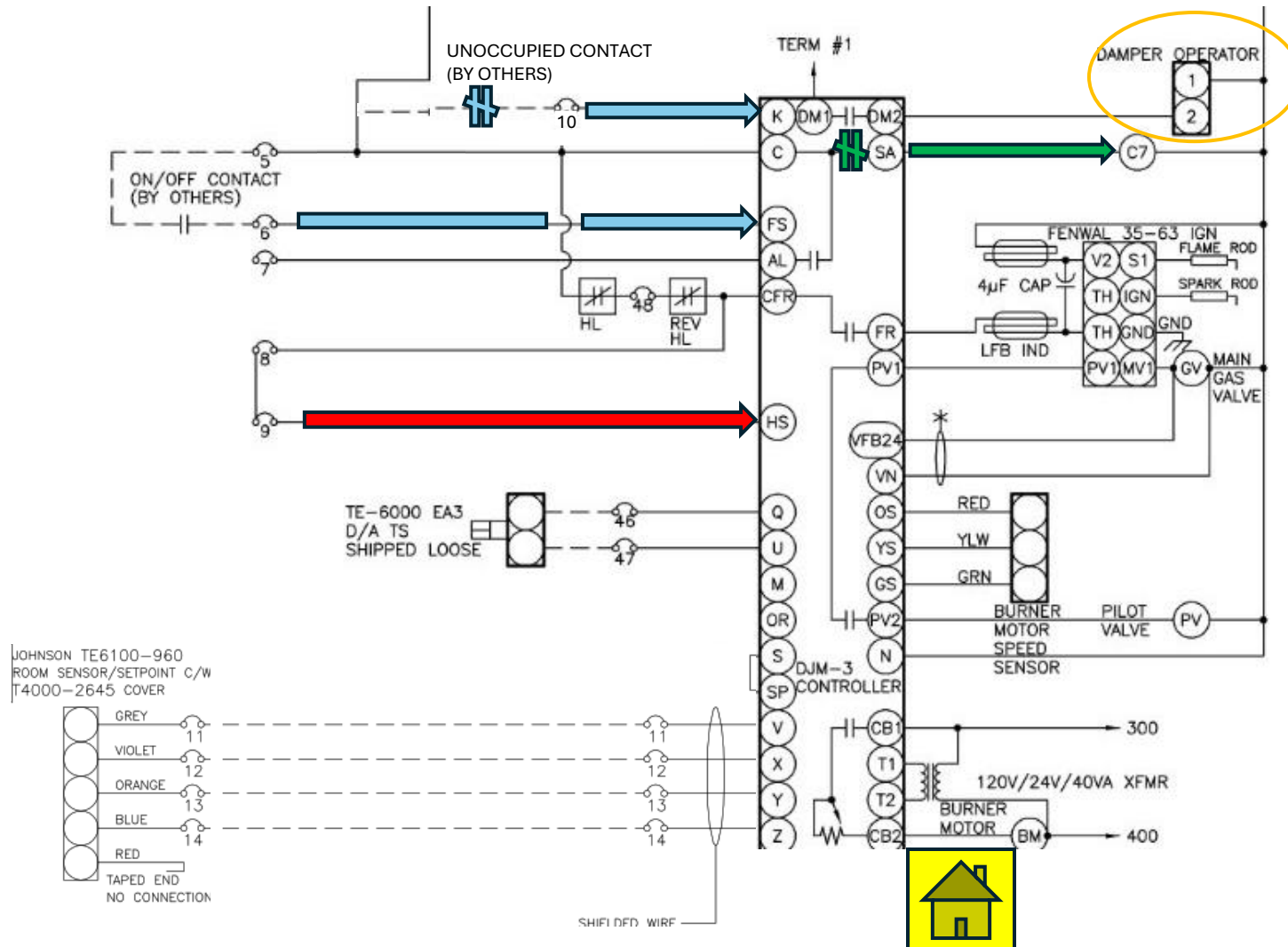
# Blower strategies night mode.(Make/Break stat)



# Blower strategies night mode.(Make/Break stat)



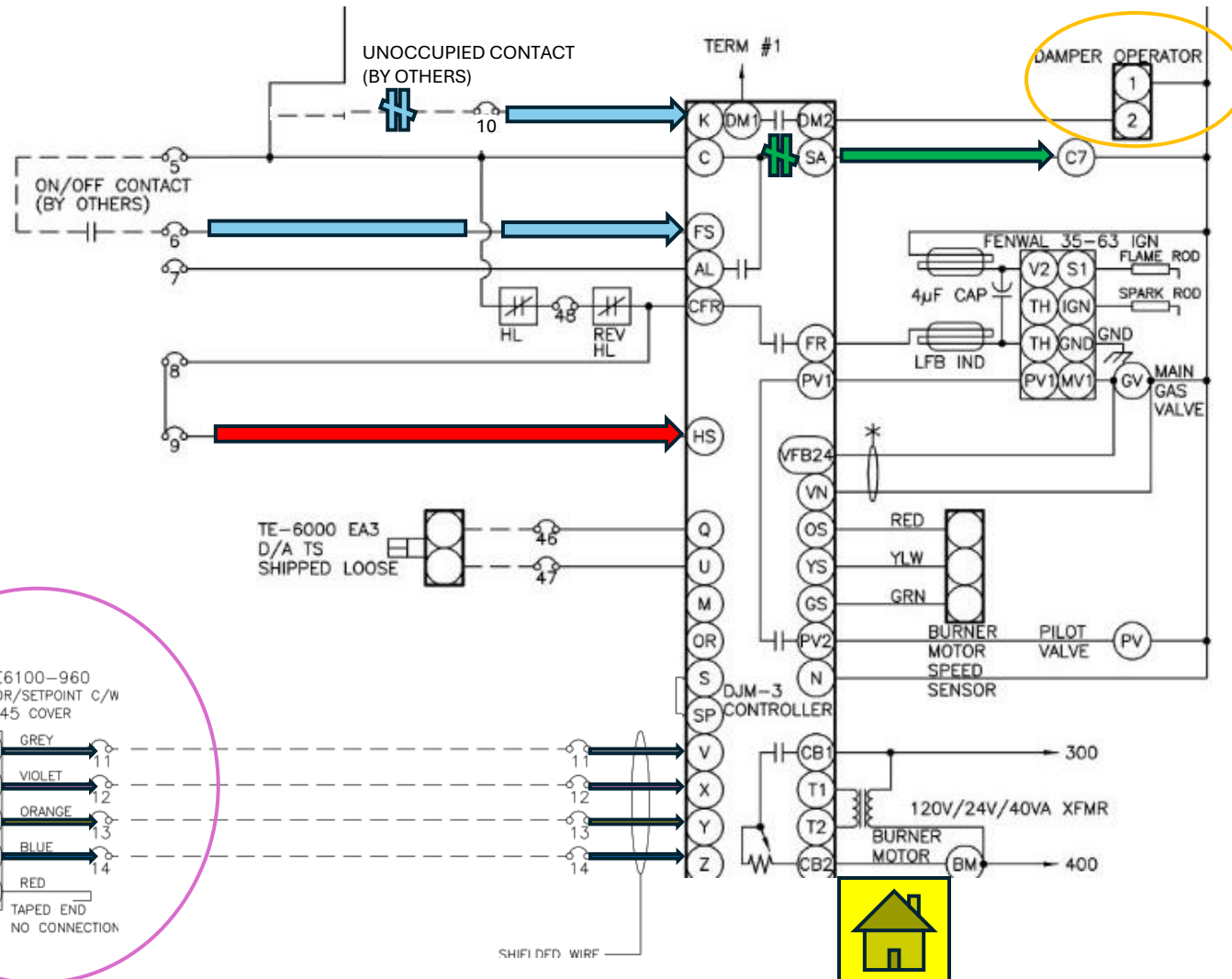
## Blower operation night mode. (Modulating room stat)



Night mode.

1. Terminal K, FS and HS powered by 24vac input.
2. Dampers remain closed.

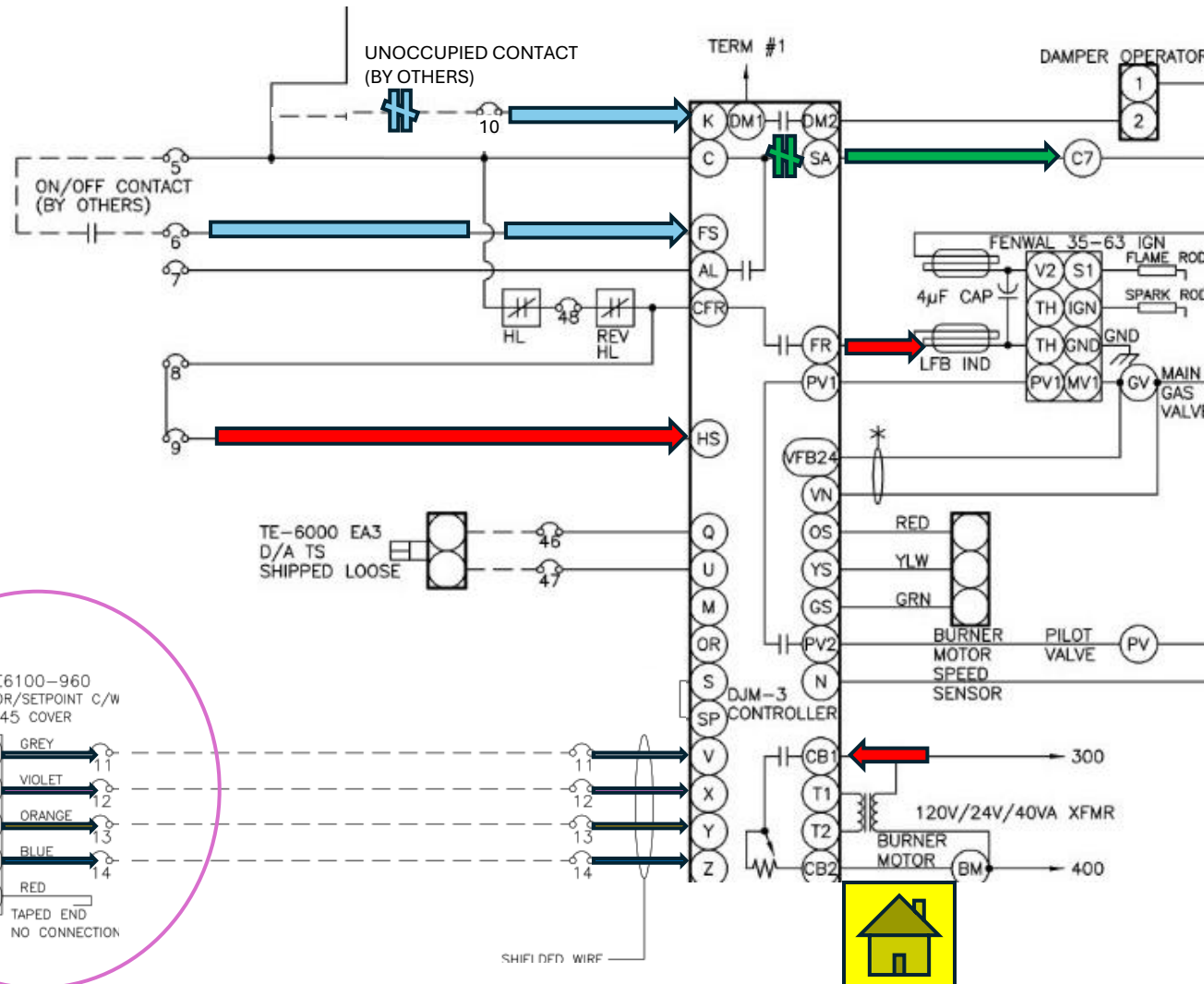
## Blower operation night mode. (Modulating room stat)



### Night mode.

1. Terminal K, FS and HS powered by 24vac input.
2. Dampers remain closed.
3. Room temperature drops 1.5°F below modulating room thermostat setpoint.

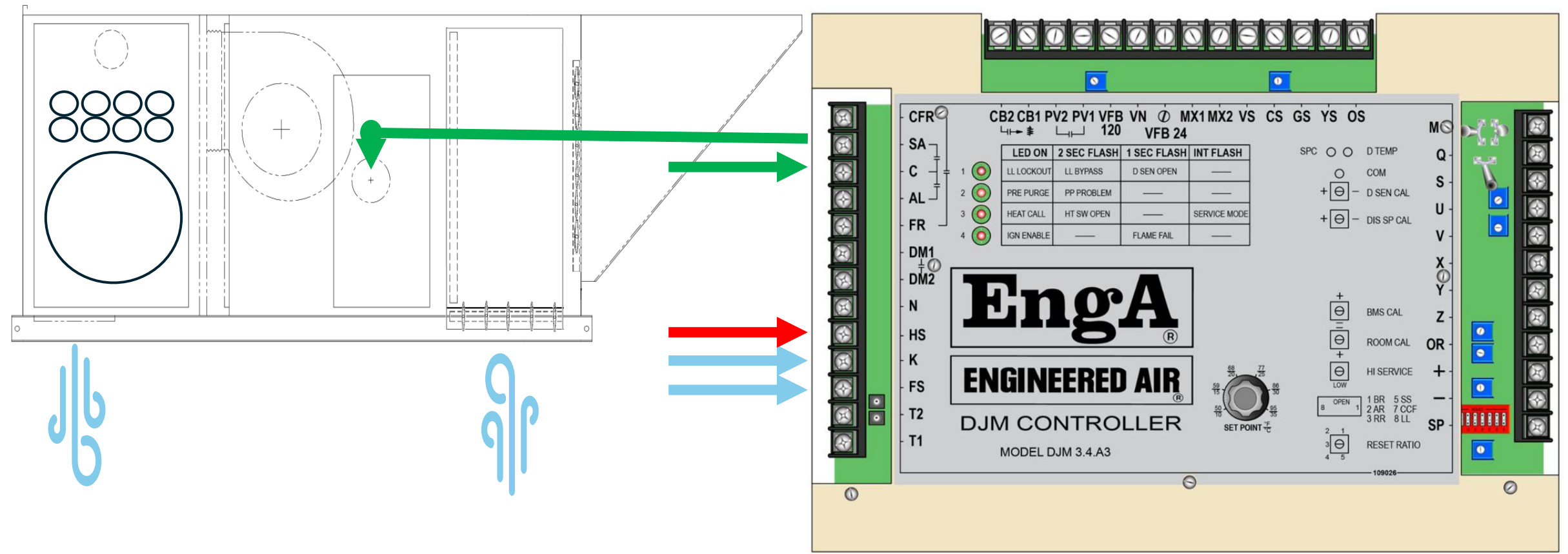
# Blower operation night mode. (Modulating room stat)



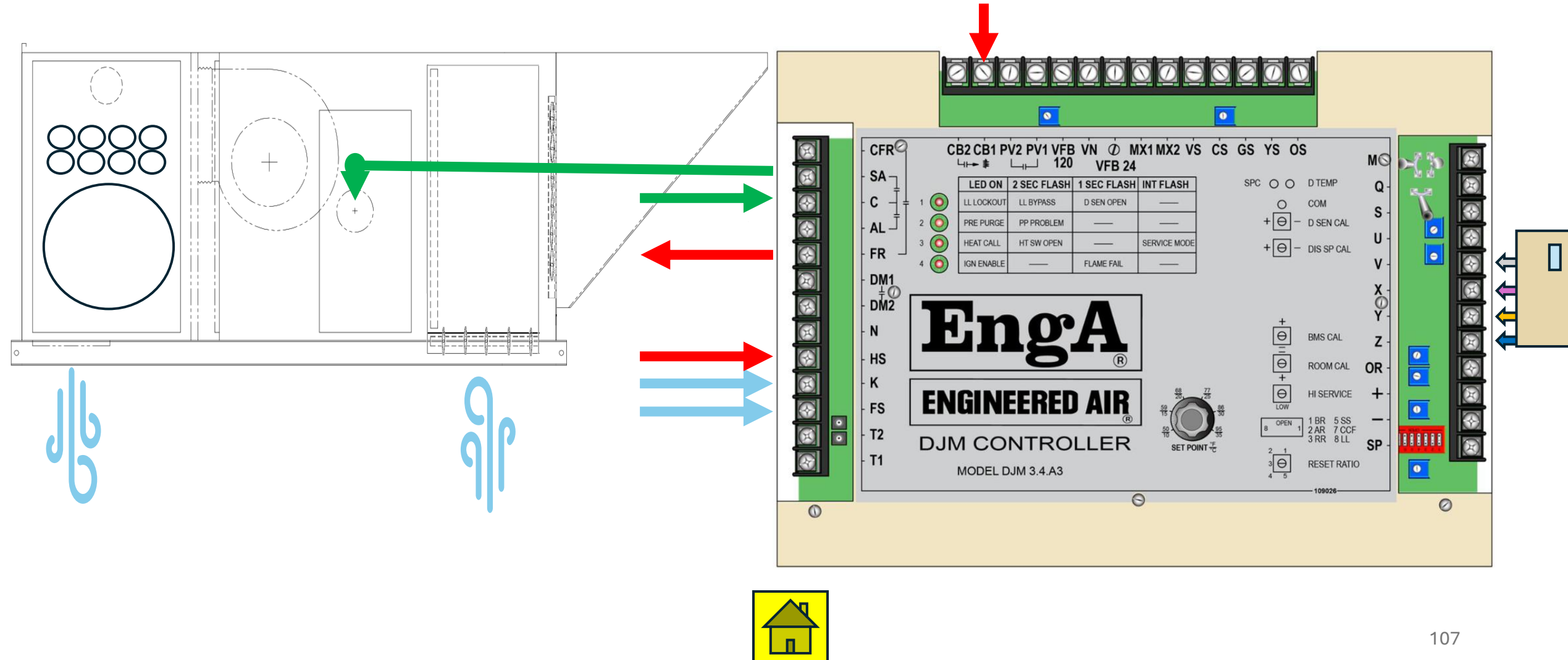
**Night mode.**

1. Terminal K, FS and HS powered by 24vac input.
2. Dampers remain closed.
3. Room temperature drops 1.5°F below modulating room thermostat setpoint.
4. Burner sequence starts.
5. Burner will fire at maximum until room temp rises 1.5°F above setpoint.

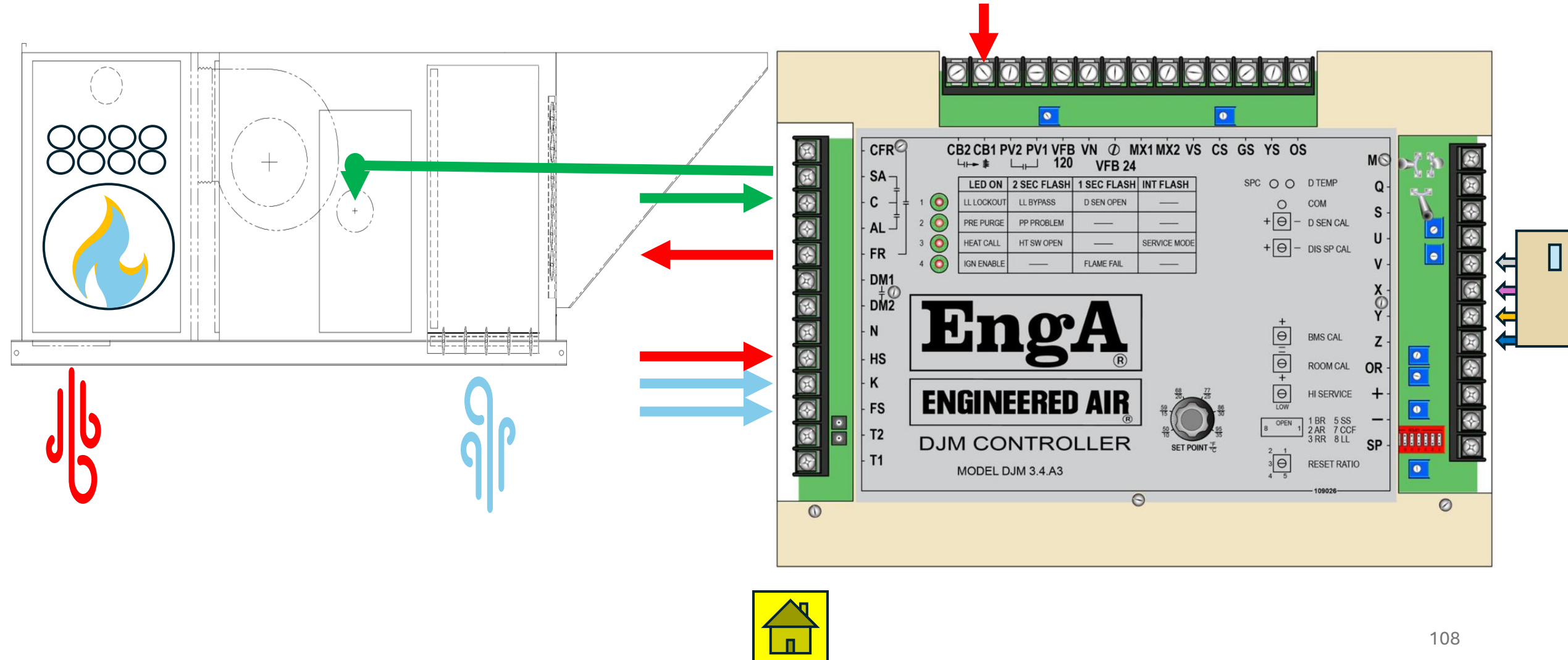
# Blower strategies night mode.(Modulating room stat)



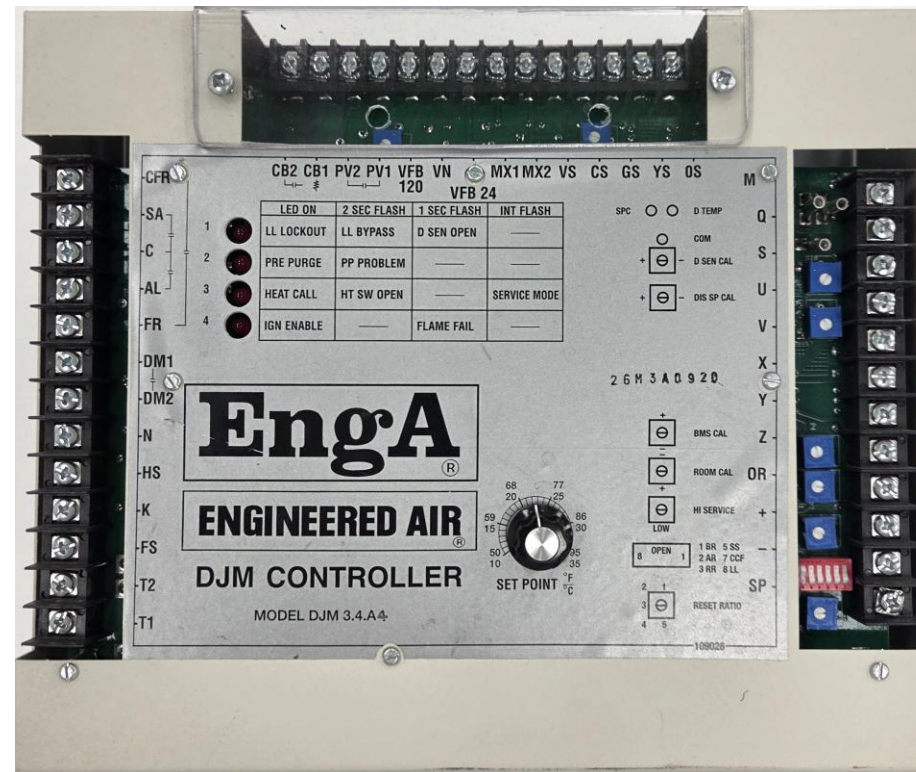
# Blower strategies night mode.(Modulating room stat)



# Blower strategies night mode.(Modulating room stat)



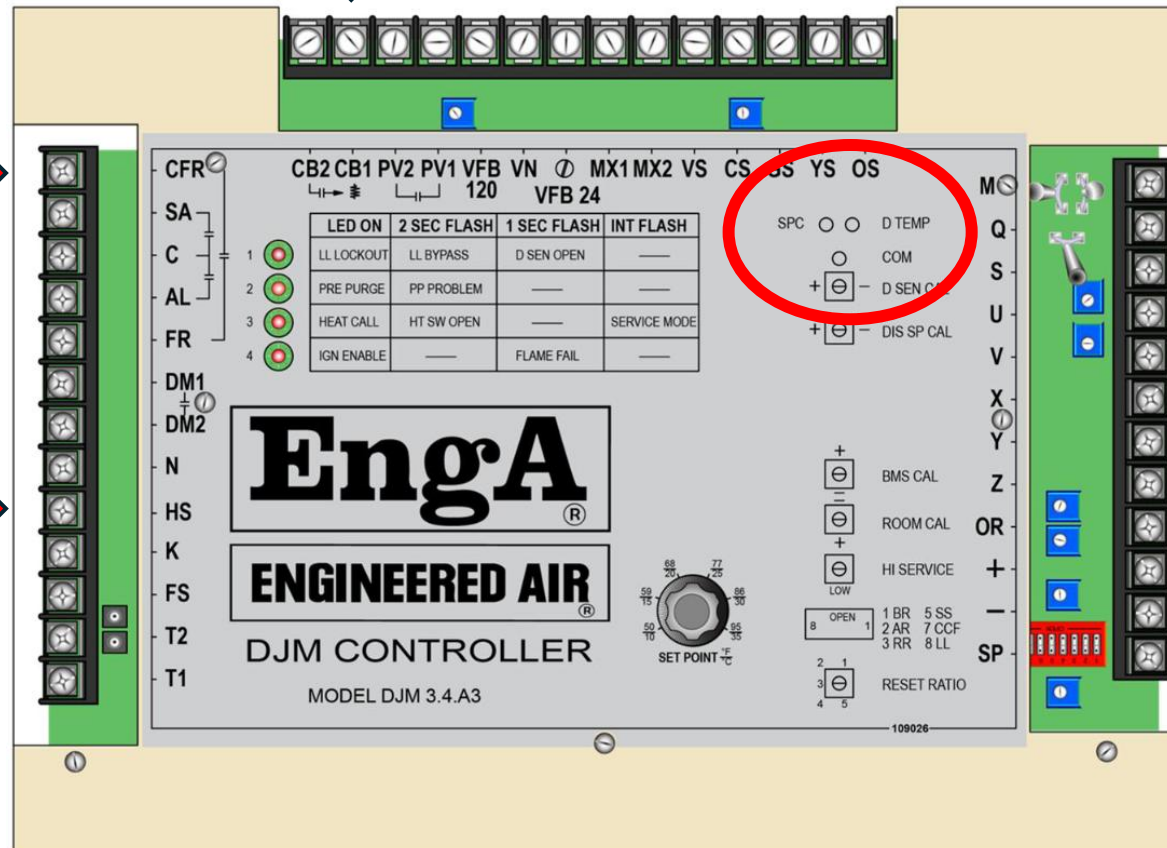
# Burner side operation.



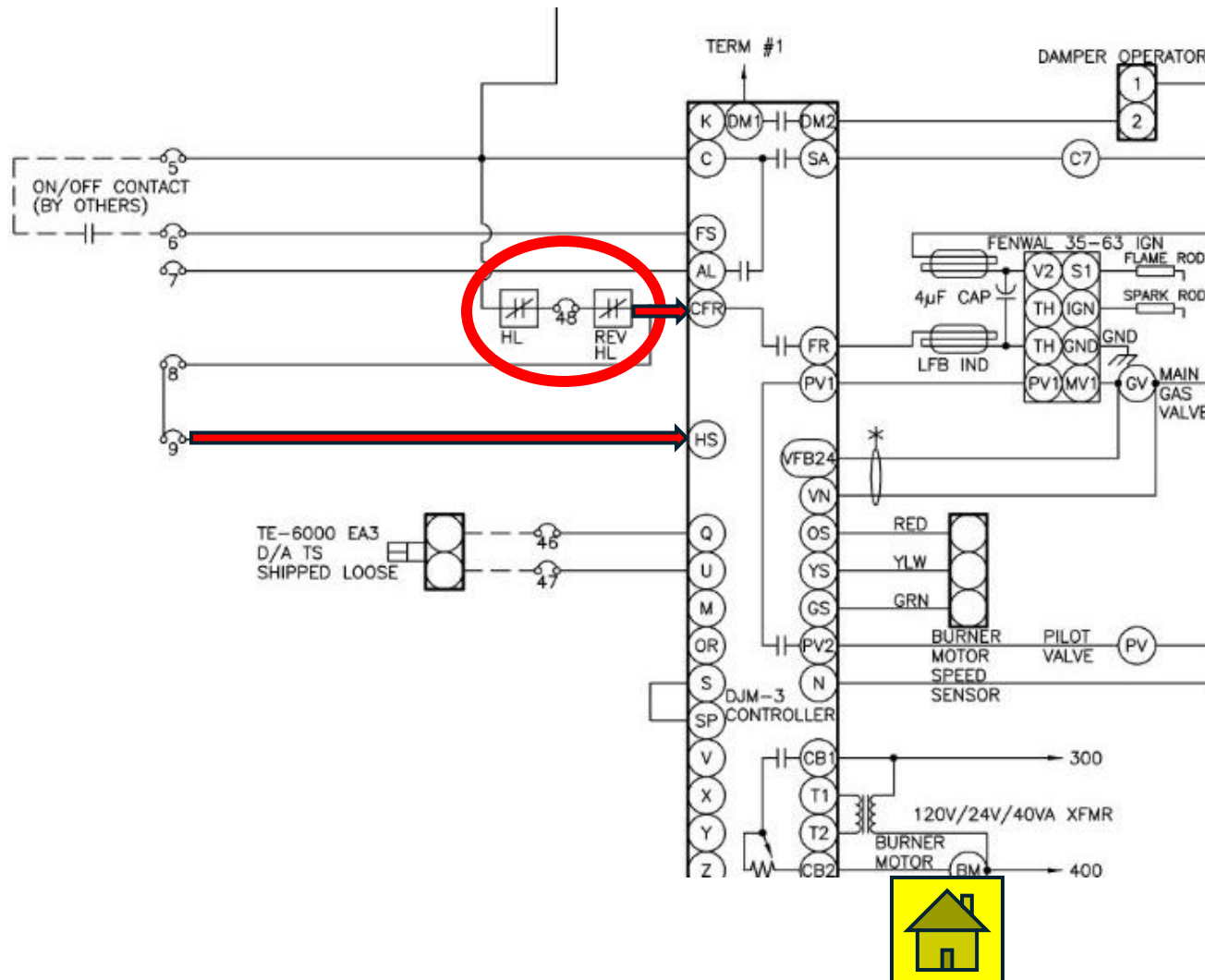
# Basic burner operation.

## Basic burner operation.

1. All safeties in series with terminal CFR must be closed.
2. Terminal HS powered by 24vac input.
3. Discharge temperature must be lower than the discharge air setpoint.
4. Burner sequence starts.



# Burner sequence.

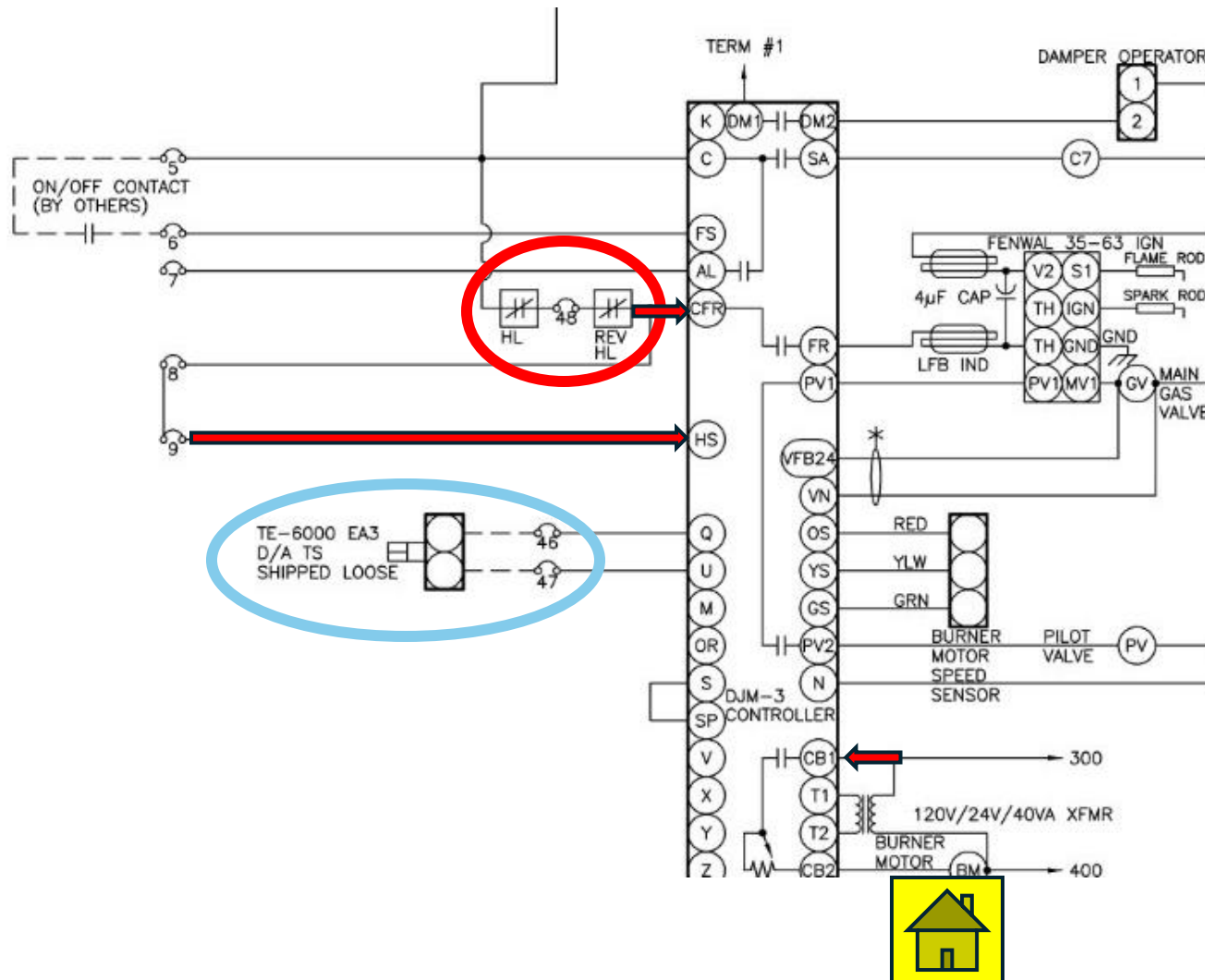


Basic burner operation.

1. All safeties in series with terminal CFR must be closed.
2. Terminal HS powered by 24vac input.



# Burner sequence.



Basic burner operation.

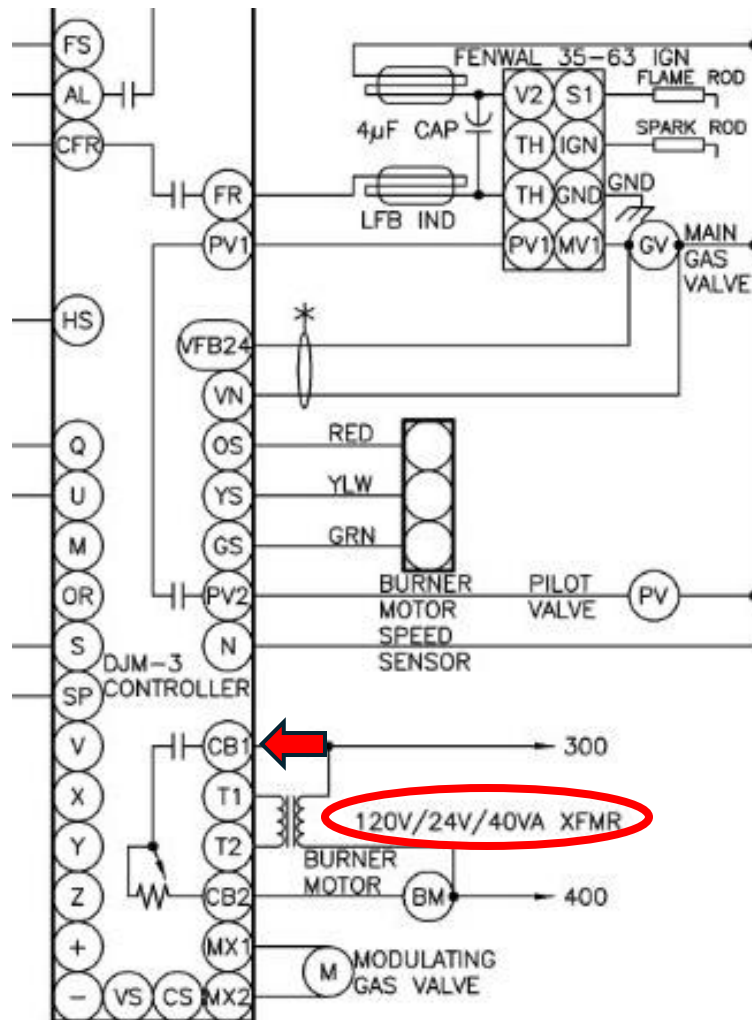
1. All safeties in series with terminal CFR must be closed.
2. Terminal HS powered by 24vac input.
3. Discharge temperature must be lower than the discharge air setpoint.
4. Burner sequence starts.



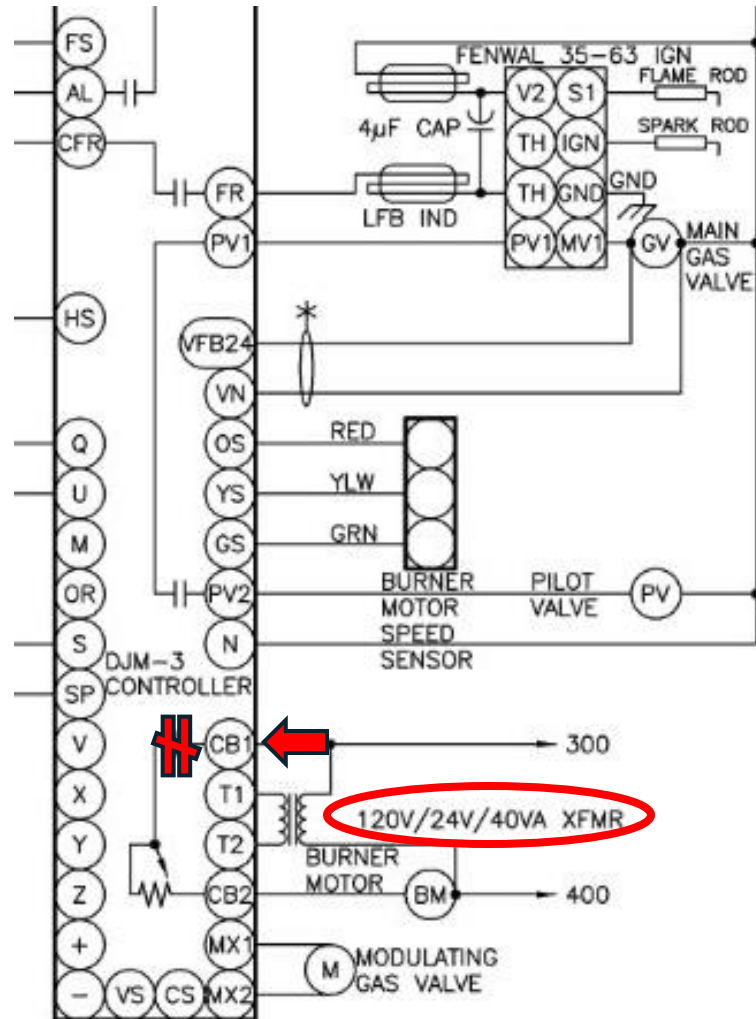
# Ignition sequence.

Ignition sequence.

1. Terminal CB1 is powered by 120vac.



# Ignition sequence.



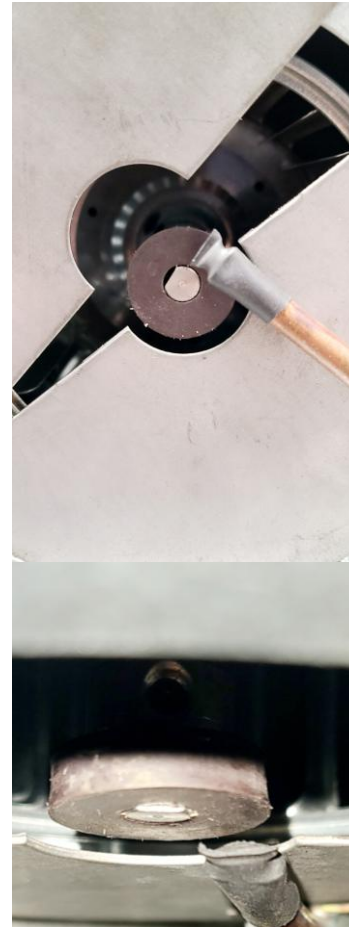
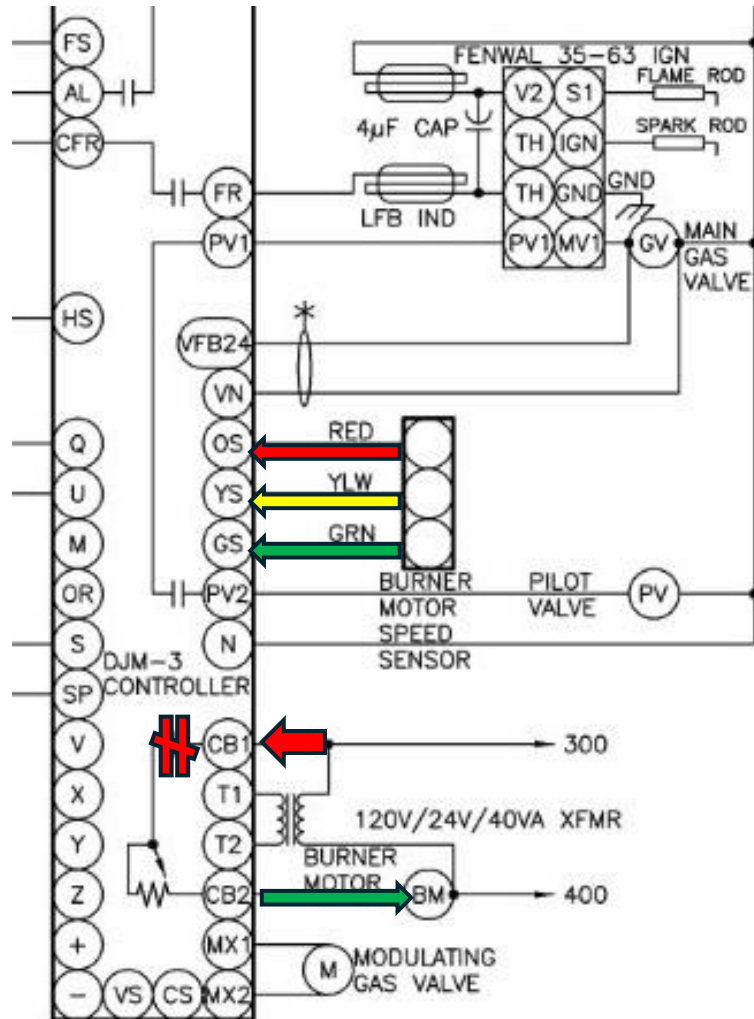
## Ignition sequence.

1. Terminal CB1 is powered by 120vac.
2. Contacts between CB1 and CB2 close.





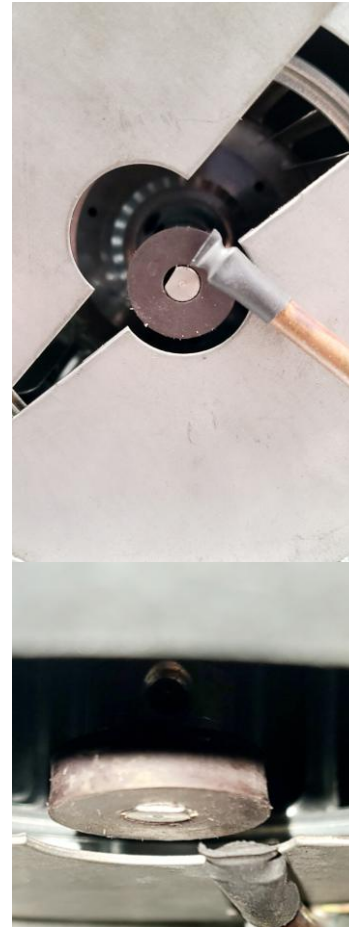
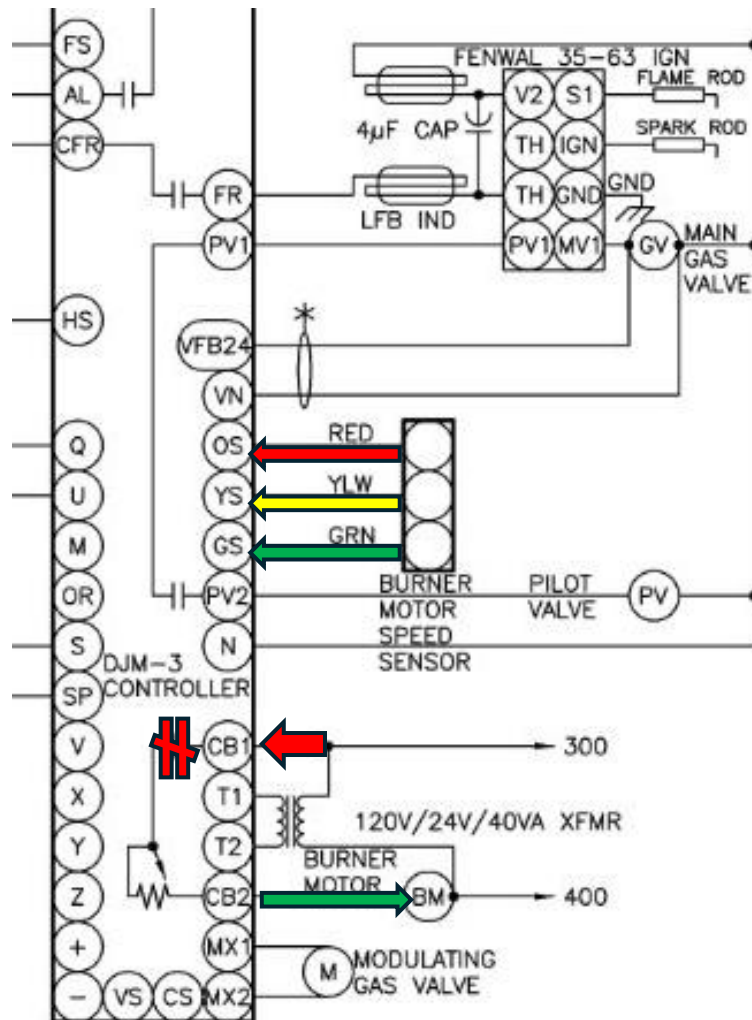
# Ignition sequence.



## Ignition sequence.

1. Burner motor speed is 3400RPM or close to 57HZ.
2. Once the burner motor is at full speed, the burner motor speed sensor will look for a stable signal from the spinning magnet at the end of the motor shaft.
3. If the signal is stable, the pre purge will last for 45 seconds.

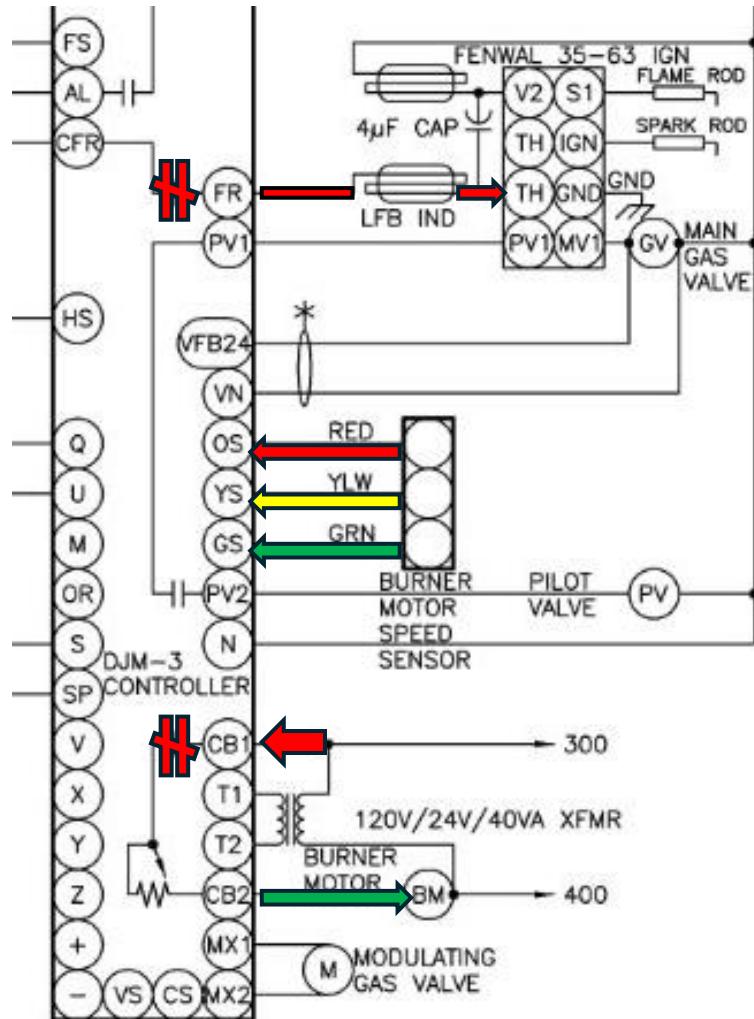
# Ignition sequence.



## Ignition sequence.

1. Once the 45 second pre purge is done, the burner motor will slow down to light off speed.
2. Light off speed is 2300RPM or 38HZ.

# Ignition sequence.



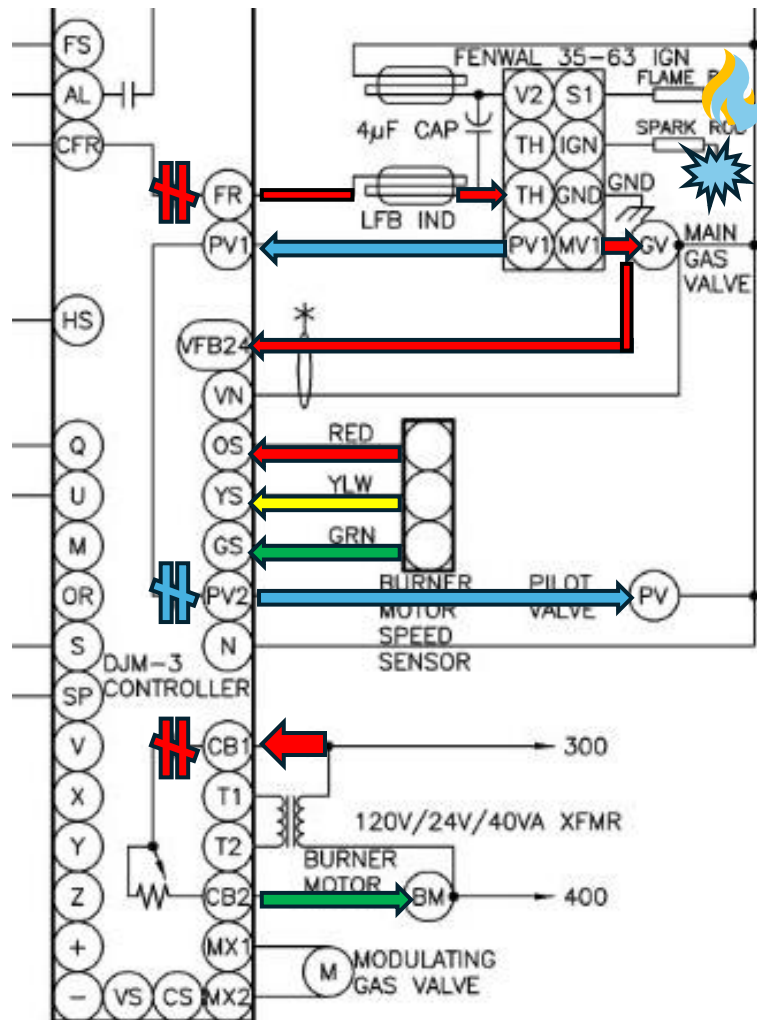
## Ignition sequence.

1. Once the burner motor is at 38HZ, the contacts between terminals CFR and FR close.
2. Terminal FR will then power terminal TH on the ignition controller.





# Ignition sequence.

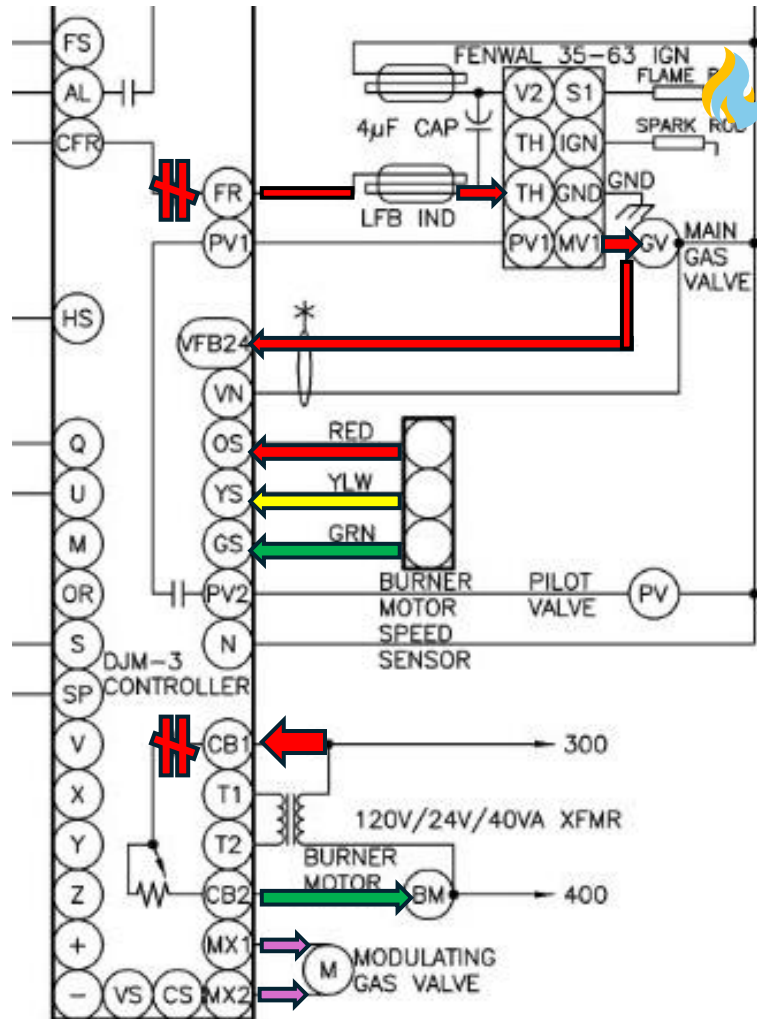


## Ignition sequence.

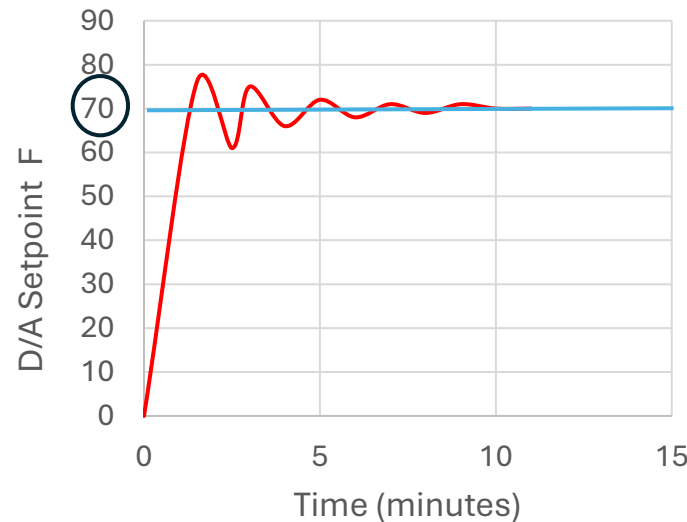
1. Once the ignition controller senses pilot flame on terminal S1 (0.7vdc and higher) the ignition controller will close its internal contacts and send power from terminal MV1 on the ignition controller to the main gas valve and terminal VFB24 or VFB 120 on the DJM3 board.



# Ignition sequence.



P.I. Control

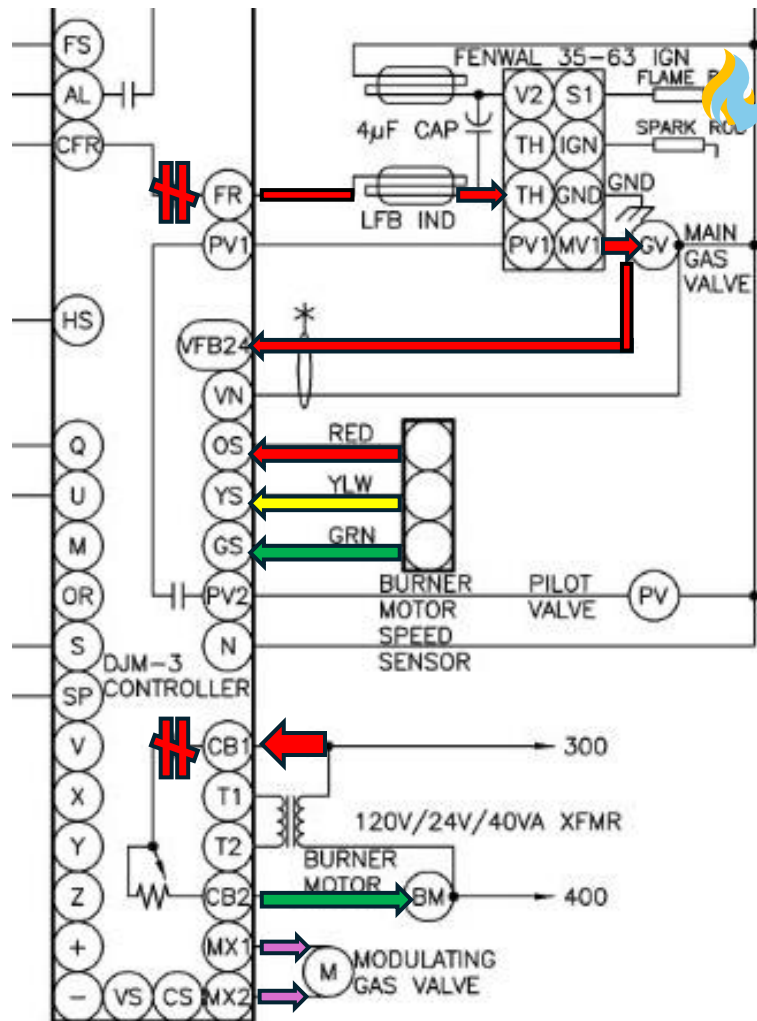


## Ignition sequence.

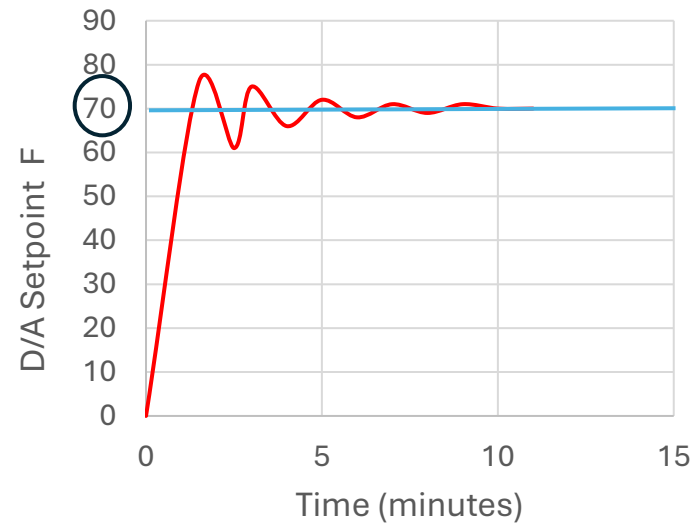
1. Now that the ignition controller is sensing main flame, the spark stops and PV1 is deenergized and the pilot valve closes.
2. The DJM3 logic now takes over to control the temperature. (P.I. control)
3. Based on how far the discharge temperature is away from the discharge setpoint; the burner motor speed will increase and at the same time, the VDC output on terminals MX1 and MX2 will increase allowing more gas to flow to the burner.



# Burner operation.



P.I. Control

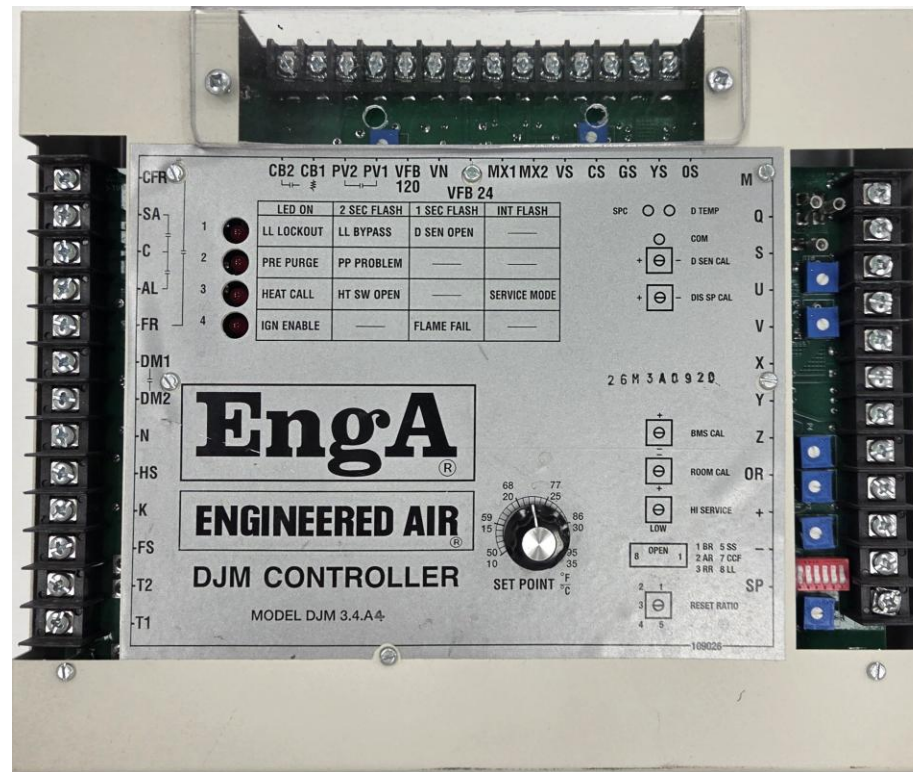


## Burner operation.

1. Now with the main burner lit, the DJM3 will vary the combustion air and modulate the gas flow to maintain the final calculated discharge setpoint.



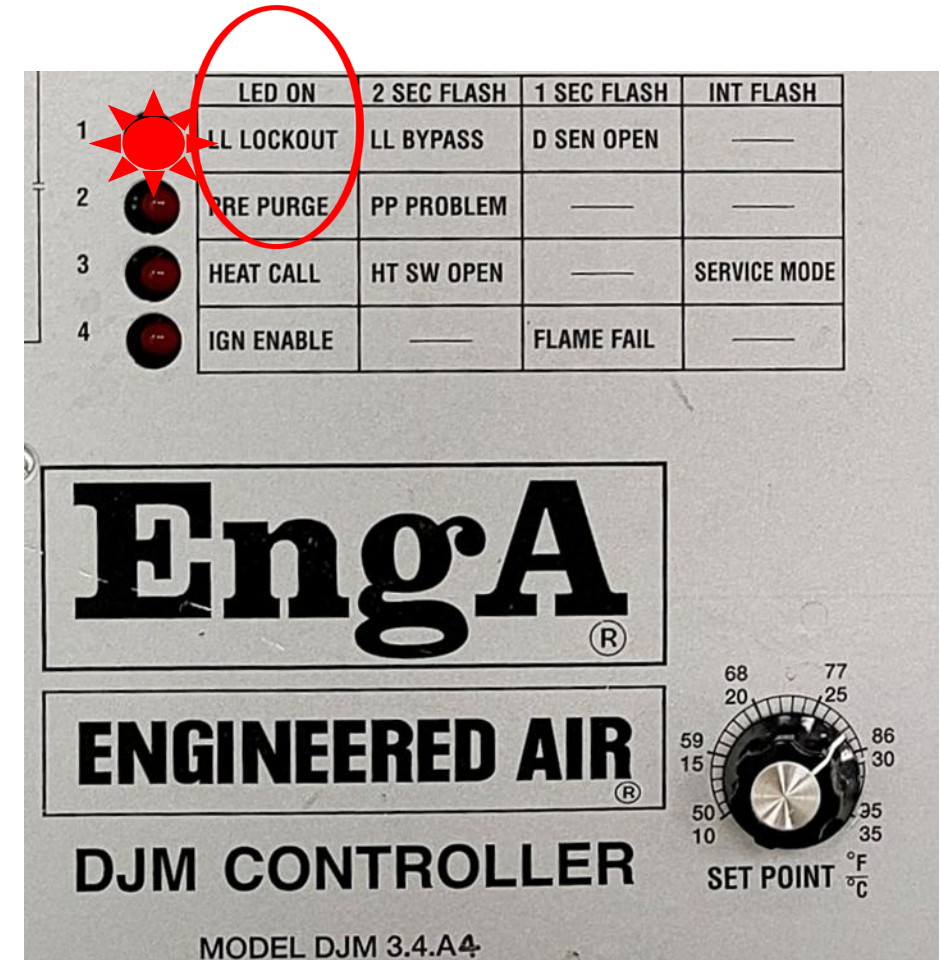
# Indication and diagnostic lights.



## Low Limit Lockout alarm.

### Cause.

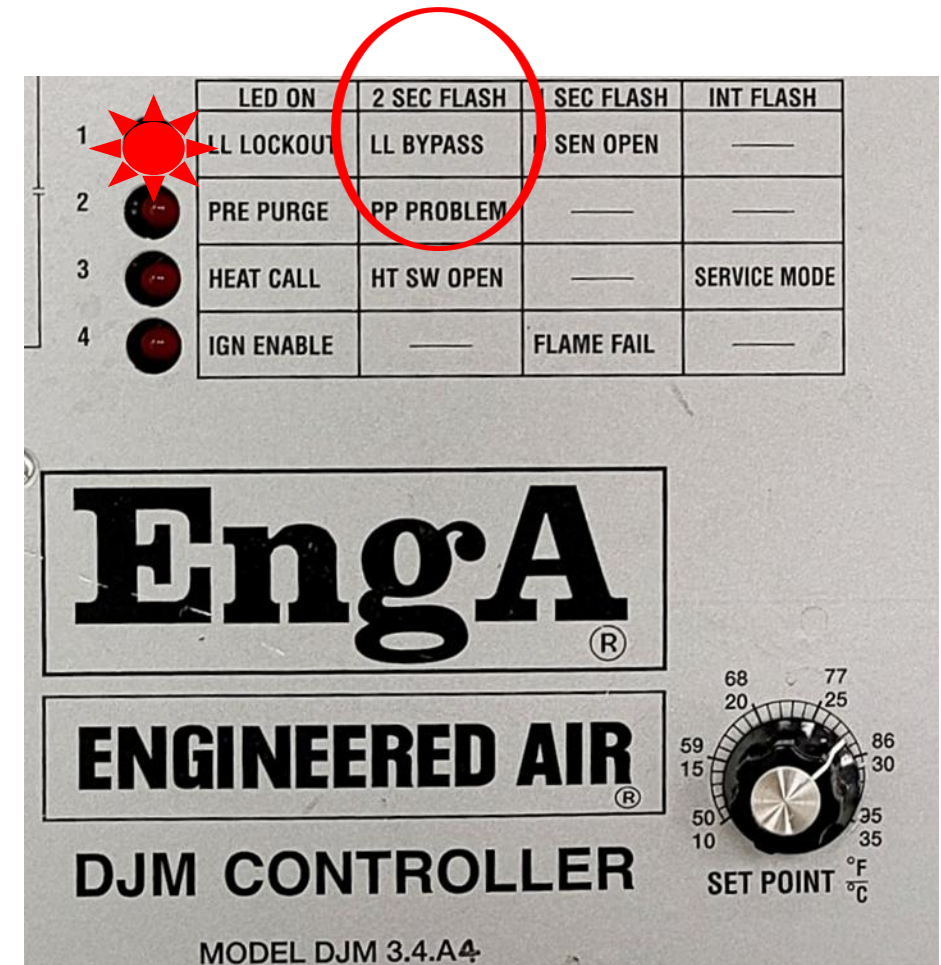
- The appliance has been shut down due to low limit failure and lockout. Discharge temperature was below 4C(40F).



## Low Limit Bypass indication.

### Cause.

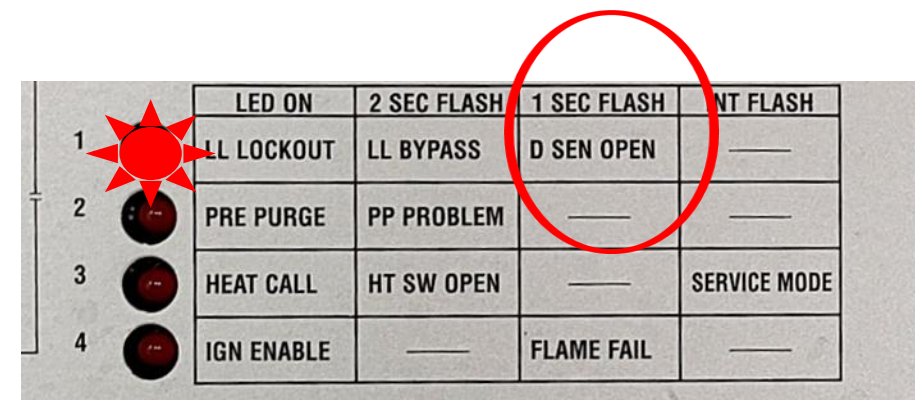
- Unit has a low discharge temperature and is timing out. If temperature does not recover to above 4C(40F) it will shut down and lockout.



# Discharge sensor open alarm.

## Cause.

- The discharge sensor circuit is open; sensor range must be between 880 and 4000 ohms.



## SENSOR TABLE

Sensor Resistance Chart for TE 6100-960 and TE6000EA3.

| °C    | °F  | Resistance Ω | °C   | °F  | Resistance Ω | °C   | °F  | Resistance Ω |
|-------|-----|--------------|------|-----|--------------|------|-----|--------------|
| -40   | -40 | 597          | 4.4  | 40  | 877          | 48.9 | 120 | 1229         |
| -34.4 | -30 | 629          | 10   | 50  | 916          | 54.4 | 130 | 1279         |
| -28.9 | -20 | 661          | 15.6 | 60  | 958          | 60   | 140 | 1329         |
| -23.3 | -10 | 694          | 21.1 | 70  | 1000         | 65.6 | 150 | 1381         |
| -17.8 | 0   | 728          | 26.7 | 80  | 1043         | 71.1 | 160 | 1433         |
| -12.2 | 10  | 763          | 32.2 | 90  | 1088         | 76.7 | 170 | 1487         |
| -6.6  | 20  | 800          | 37.8 | 100 | 1134         | 82.2 | 180 | 1542         |
| -1.1  | 30  | 838          | 43.3 | 110 | 1181         | 87.8 | 190 | 1599         |

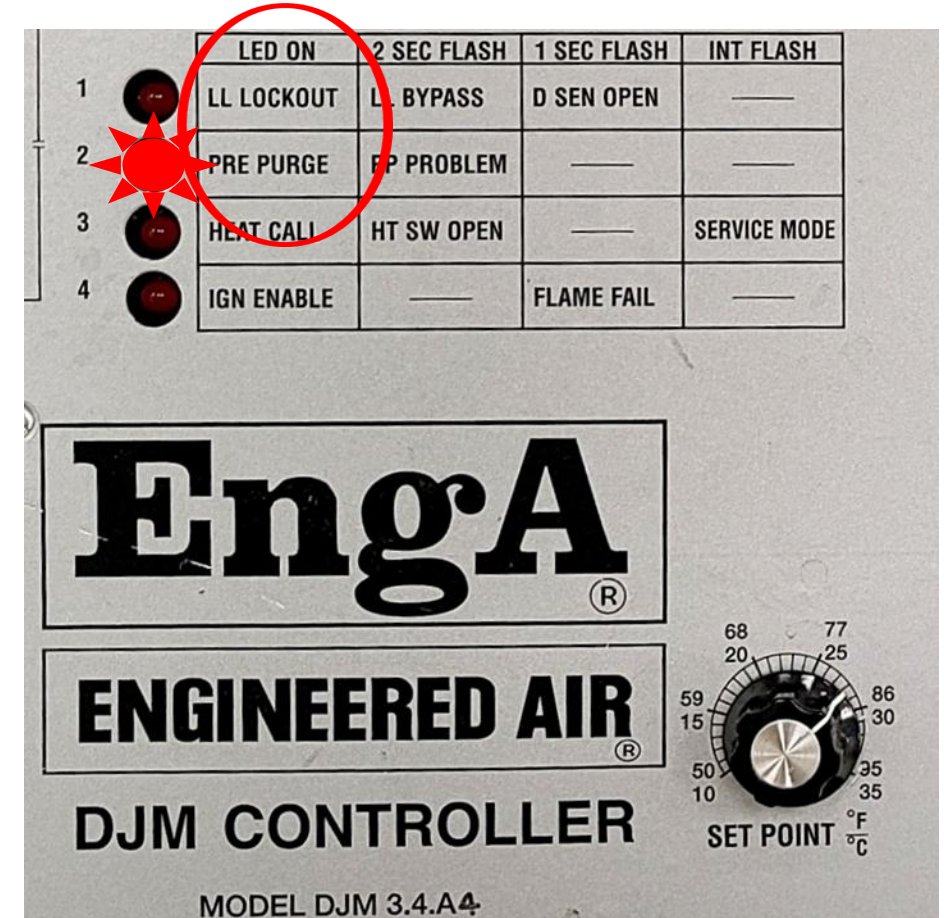
Note: Reference resistance is 1035 ohms at 77°F. Resistance tolerances are ±0.05 to 0.15% at 77°F.



## Pre Purge indication.

### Cause.

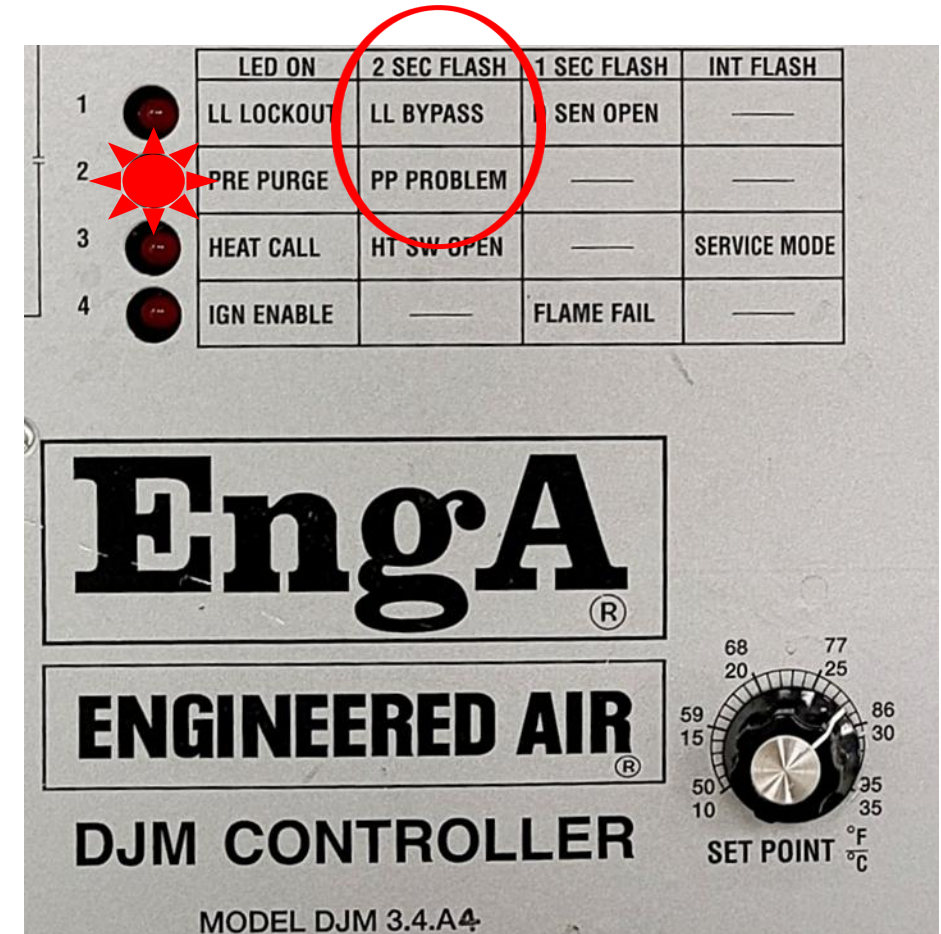
- The combustion blower is purging the heat exchanger as a preliminary to ignition.



## Pre Purge Problem indication.

### Cause.

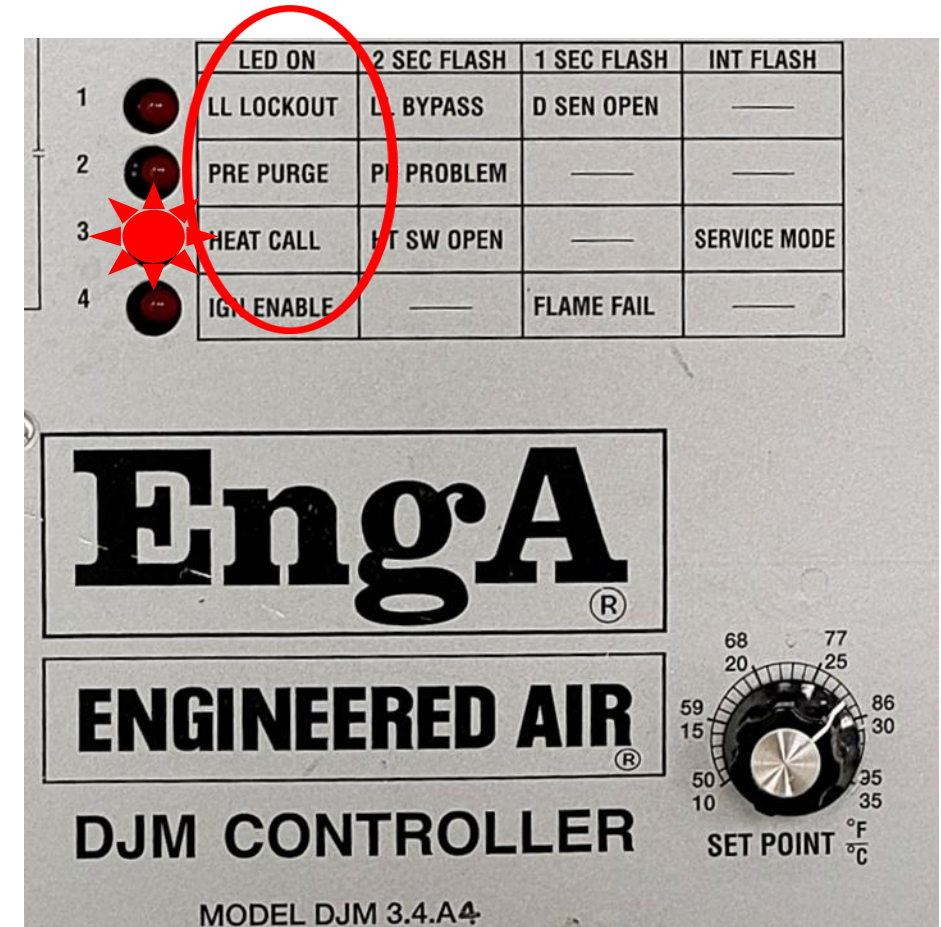
- Pre Purge problem. The DJM3 is not receiving a correct signal from the hall effect tachometer sensor, into terminals YS,OS,GS.



## Heat Call indication.

### Cause.

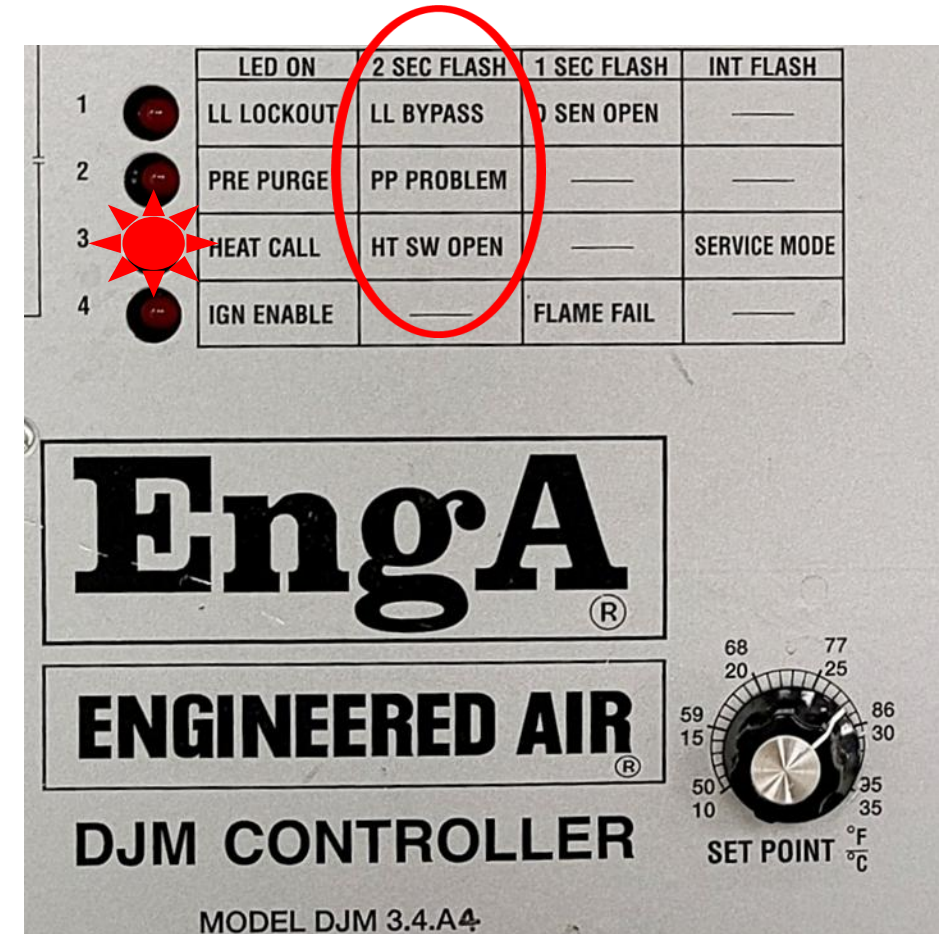
- The discharge sensor is below the calculated setpoint (SPC) and the DJM3 has initiated the heating sequence.



## Heat switch open indication.

### Cause.

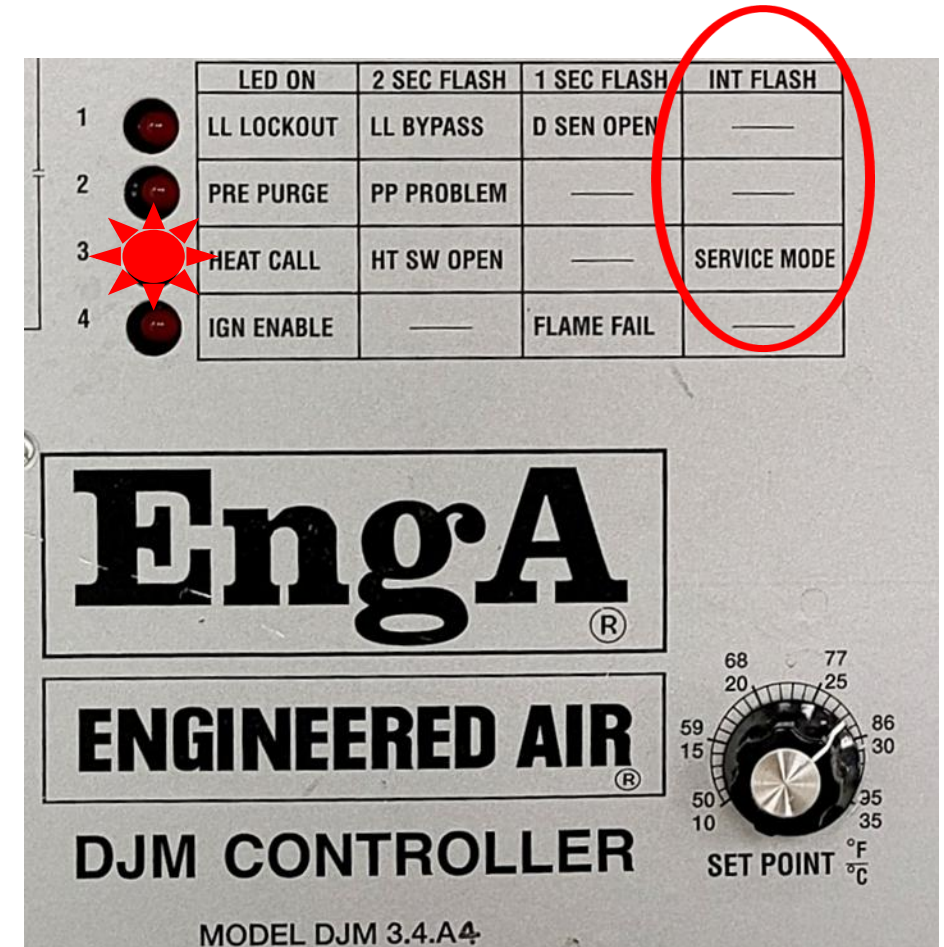
- There is a call for heating, however the heating has been disabled from no input into terminal HS. (24vac).



## Service mode indication.

### Cause.

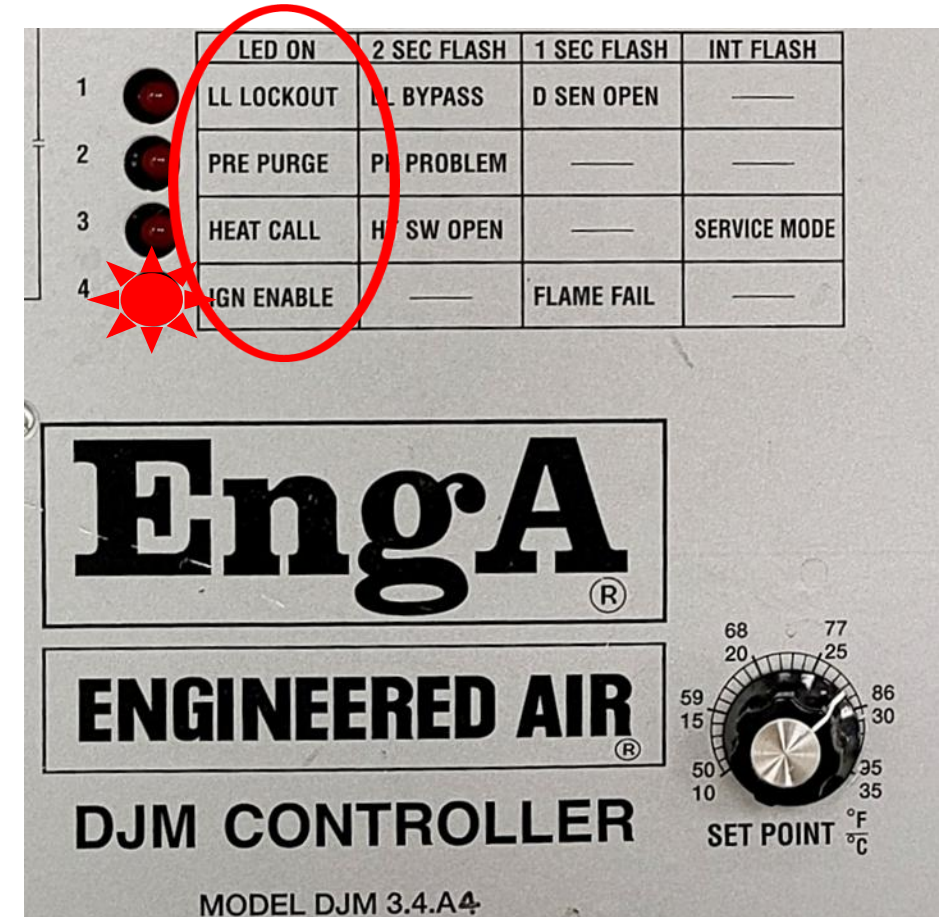
- Unit is in service mode (dip switch #5 is on) allowing the technician to manually set the heating from low to high fire with the service pot.



## Ignition enable indication.

### Cause.

- FR and CFR contacts have closed, enabling the ignition control to fire the burner.



## Flame failure alarm.

### Cause.

- Burner ignition was unsuccessful. The DJM3 did not receive a main gas valve (SSOV) feedback signal to terminals VN and VFB24 or VFB120.

